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Executive Summary

Current Marine Corps warfighting concepts anticipate an increasingly hostile and uncertain battlefield that will be defended by highly mobile and dispersed combat forces. Such an environment requires a reduced medical presence that responds quickly without compromising the standard of care. To achieve these goals, the Marine Corps must rely more heavily on medical evacuation and en route care, the process of providing essential medical care while transporting critically injured and ill casualties.

The Marine Corps has launched an effort to develop the En Route Care System (ERCS). The Naval Health Research Center and the Marine Corps Combat Development Center sponsored a conference to (1) identify the equipment and consumable supplies required to provide en route care during tactical medical evacuation, and (2) determine the skills and personnel required to provide en route care. The objectives of this paper are to provide a comprehensive understanding of the need for en route care, detail the pertinent factors shaping ERCS, and document the development of ERCS medical resource requirements.

Included in this paper is a description of the en route care conference, which helped to define the clinical capability needed to provide en route care of critically injured and ill casualties during tactical evacuation. Highly experienced military subject matter experts (SMEs) discussed the knowledge base and clinical skills necessary to provide en route care during tactical evacuation. Clinical skills including airway management; ventilator management, including troubleshooting alarms, verifying tidal volume and cuff pressures, recalibrating at altitude, and optimizing settings if oxygenation worsens or deteriorates, hemodynamic monitoring; and fluid status monitoring and intervention were discussed. The implications of altitude on a variety of medical factors, including reduced atmospheric pressure, dehydration, motion sickness, and fatigue, were also covered. Every attempt was made to standardize medical materiel with the Forward Resuscitative Surgery System and other Marine Corps medical assemblages.

This report is organized into seven sections. Section 1 is an introduction. Section 2 provides an overview of the medical evacuation system. Section 3 references relevant doctrinal guidance used to focus the development of ERCS. The development of the methodology, the patient treatment profiles, and the medications, supplies and equipment requirements are detailed in Section 3. Section 4 reviews the SMEs' recommendations for ERCS personnel. Sections 5 and 6 present some issues and conclusions related to en route care.

Marine Corps En Route Care System (ERCS): Development of Patient Treatment and Supply Requirements

Introduction

Current Marine Corps warfighting concepts anticipate an increasingly hostile and uncertain battlefield that will be defended by highly mobile and dispersed combat forces. Such an environment requires a reduced medical presence that responds quickly without compromising the standard of care. To achieve these goals, the Marine Corps must rely more heavily on medical evacuation and en route care, the process of providing essential medical care while transporting critically injured and ill casualties.

Medical evacuation and en route care have proved valuable in saving lives and conserving military manpower; the timely movement of casualties to appropriate levels of care reduces casualty care waiting time and allows facilities to relocate. In addition, rapidly evacuating casualties from units facilitates their maneuverability and sustains morale and fighting spirit.

To assure casualties are safely transported during evacuation to more definitive care, en route care must address two major concerns. First, patients must be adequately prepared for evacuation; second, the system must be capable of maintaining the patient's "stability" during tactical evacuation by providing the right medical personnel and medical materiel to perform required clinical tasks.

In response to this need, the Marine Corps has launched an effort to develop the En Route Care System (ERCS). The Naval Health Research Center (NHRC) and U.S. Marine Corps Combat Development Center (MCCDC) sponsored the Subject Matter Expert Review of Medical Evacuation Resource Requirements. This conference was organized to (1) identify the equipment and consumable supplies required for ERCS during tactical medical evacuation, and (2) determine the skills and personnel required for ERCS. The objectives of this paper are to provide a comprehensive understanding of the need for en route care, detail the pertinent factors shaping ERCS, and document the development of ERCS medical resource requirements.

Background

The Naval Medical Department conducts patient evacuation covering the entire battlefield. The continuum of care includes the initial identification of a casualty through the transportation to a definitive hospital facility. The Marine Corps medical evacuation chain has three phases: casualty evacuation (CASEVAC), tactical medical evacuation (MEDEVAC), and strategic evacuation (see Figure 1). CASEVAC and MEDEVAC are part of the intratheater patient movement system, which uses surface and air resources to evacuate patients to medical treatment facilities (MTFs). Navy medical personnel assigned to Marine Corps units are responsible for providing medical care for injured and ill Marines at forward areas.

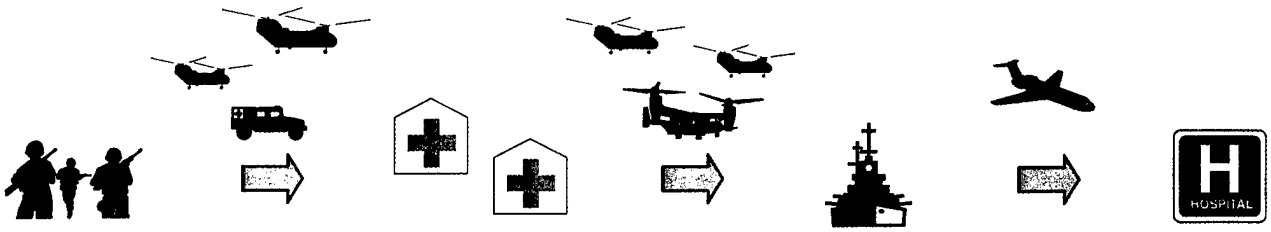

Figure 1. Medical Evacuation Chain

CASEVAC, phase one, renders care during patient transport from the point of injury to a casualty collection point or medical treatment facility, such as the Shock Trauma Platoon (STP), Forward Resuscitative Surgery System (FRSS), or the Surgical Company (SC). The casualty may not have received care or may have received care from a buddy, a field corpsman, or a medical officer at a Battalion Aid Station (BAS) prior to CASEVAC.

MEDEVAC, phase two of en route care, provides care during evacuation from a BAS, STP, FRSS, or SC to a theater hospital. STPs and FRSSs have led to advanced, professional medical and surgical care significantly earlier in patient treatment. SCs are often too far back to intervene when lives can be saved. As time between a patient developing serious posttraumatic shock and the onset of resuscitation decreases, the percentage of surviving patients increases. Forward surgical teams like FRSS provide lifesaving surgical treatment much farther forward than previously possible. For high mobility, FRSS procedures are limited to those that can be conducted in an abbreviated, staged manner, including establishing surgical airways, applying temporary measures to control surgical bleeding and contamination, and rapid closure of the chest and abdomen. When damage control or the initial intervention surgery has been performed, MEDEVAC becomes the priority.

Strategic evacuation, phase three, renders care during evacuation from the theater hospital to definitive care in the continental United States or outside the continental United States. Fixed-wing aircraft usually support strategic evacuation.

Factors Affecting ERCS

NHRC used the following factors as a framework for developing ERCS for MEDEVAC: the impact of FRSS, Marine Corps and Navy directives, the En Route Care Operational Requirements Document, and the aircraft available for en route care.

Impact of FRSS

In response to changing warfighting concepts, MCCDC and the Marine Corps Systems Command (MARCORSYSCOM) developed the FRSS. Marine Corps concepts and doctrine state that warfighting will require increased mobility and dispersion, and reflect a higher tempo of operations among combat elements. These goals require Marine Corps medical assets to achieve greater mobility and faster response without compromising the high level of care traditionally administered. Similar to the Army's Forward Surgical Team, FRSS is a highly mobile, rapidly deployable, trauma surgical unit designed to provide emergency surgical interventions required to stabilize casualties who might otherwise die or lose limbs before reaching treatment. NHRC determined the medical tasks necessary to treat patients in the FRSS, and the consumable supplies and equipment required to complete those tasks (Galarneau, Konoske, & Pang, 1999).

En route care is a complimentary capability and critical to the success of FRSS. The FRSS mission is to provide a rapidly deployable, initial surgery capability required to save life or limb and stabilize the patient for evacuation. FRSS may be used as the initial surgical capability ashore in the traditional amphibious assault, or it may be the only surgical capability ashore, as in an Operational Maneuver From the Sea (OMFTS) scenario. To meet this mission, FRSS requires a small logistical footprint that supports early introduction into the operating area, rapid movement, deployment, and re-deployment in forward areas. This smaller footprint reduces holding capability and eliminates convalescent beds. As a result, forward surgical support is increasingly dependent on tactical evacuation, requiring an increase in evacuation missions and the standard of en route care.

Directives Shaping ERCS

ERCS has been shaped by Marine Corps concepts and doctrine, recommendations from the Operation Desert Storm lessons learned, the Joint Health Service Support (JHSS) 2010 En Route Care Seminar Report, a mission area analysis (MAA) by MCCDC, and Medical Readiness Strategic Plan 2001 (MRSP).

Marine Corps Doctrine

In recent years, the Marine Corps has changed its concepts and doctrine to achieve more flexible and effective combat operations. To accomplish this goal as expressed in OMFTS, Concept of Naval Force Medical Protection for the 21st Century, Joint Vision 2020, Marine Corps Strategy 21, Ship to Objective Maneuver, and Expeditionary Maneuver Warfare requires highly mobile medical units with improved responsiveness. The success of such units is impossible without the development of more task-organized, flexible, and efficient medical supply configurations that match the speed and mobility of Marine Corps contingency response operations.

MRSP 2001

The MRSP 2001 called for the review of medical evacuation systems, recognizing the need to define patient evacuation requirements and ensure the availability of personnel (DoD, 1994). The plan also called for the development of an integrated capability for medical evacuation that includes air, land, and sea assets, as well as the development of joint doctrine for the entire medical evacuation system to ensure that all levels of evacuation are interoperable. Patient Movement Items (PMIs), items associated with the en route care, should become standard and interoperable among the services, and a system for PMI certification, tracking, maintenance, and recovery needs to be developed.

Recommendations from Operation Desert Storm

Although Navy medical planners were generally satisfied with the evacuation system during Operation Desert Storm, it was recommended that MEDEVAC requirements such as medical support equipment and personnel be formalized in future planning. Estimates for ground combat casualties were not used in determining necessary helicopter assets, medical supplies, or aeromedical personnel needed for aeromedical evacuation. A significant lesson learned during Operation Desert Storm was the need to provide better coordination of MEDEVAC missions so that wounded Marines could be treated for their injuries more quickly (Graham, Burns, and Keefer, 1991).

JHSS 2010 En Route Care Seminar (1997)

The JHSS 2010 En Route Care Seminar, sponsored by the J-4/Medical Readiness Division and the Office of the Surgeon General, United States Air Force, in May 1997, examined then current en route care and determined requirements for a future en route care system. The panel of military and civilian subject matter experts (SMEs) provided recommendations regarding competencies, providers, training, equipment, and technology necessary to maintain care during all stages of evacuation. SMEs analyzed case studies to ascertain clinical considerations, core competencies, providers, and equipment requirements for each stage of en route care. The panel advocated a joint view, recommending that medical training, certification programs, and medical transport equipment be standardized across the Services. The panel also identified the Emergency Medical Technician- Intermediate/Military (EMT I/M) as meeting the competency requirement for MEDEVAC of noncritical patients. For critical patients, the panel suggested that an EMT Paramedic/Military (P/M) augment the EMT I/M during MEDEVAC.

Mission Area Analysis

MAAs are conducted by MCCDC to provide an analytical, logical, and defendable basis to identify capability deficiencies and generate requirements. Recently, an MAA was developed to evaluate the ability of a Marine Expeditionary Brigade to support a sustained operation ashore (SOA) (MAA SOA 2012). This MAA employed an FRSS, en route care capability, SC, Navy fleet hospital, and aeromedical staging facility. The results of the MAA indicated that FRSS was

capable of providing resuscitative surgery for the estimated casualty flow and that the en route care system was expected to increase the survival of postsurgical patients evacuated from the FRSS and the most critically injured casualties evacuated from the BASs and STPs.

En Route Care Operational Requirements Document

The Operational Requirements Document (ORD) provides the requirements for ERCS. Appendix A is the version of the ORD that was used at the time of the SME Review of Medical Evacuation Resource Requirements (the most current version is available at www.cdts.marcorsyscom.usmc.mil/cdts/cdts.nsf). The system description, mission need, and the operational concept are provided below.

The system description reads, "The ERCS is a modular system that includes medical equipment, medical treatment protocols, communication protocols, and consumable supplies necessary for the medical management of two critically injured/ill, but stabilized, casualties during transport onboard Marine Corps aircraft from elements ashore to elements at sea or ashore."

The mission need is identified as follows: "The Marine Corps does not have the capability to safely transport and provide critical/required medical care of patients who are at risk of sudden, life threatening changes in their clinical status during transport to higher echelon care over the times and distances expected in an Expeditionary Maneuver Warfare (EMW) environment. The En Route Care System satisfies this need and is an essential follow-up program to the Forward Resuscitative Surgery System."

The operational concept reads, "Over the horizon force projection with operational reach approaching 200 nautical miles (nm) will increase the distances and transit time involved in casualty evacuation and increase the risk of in-transit clinical degradation of severely wounded casualties. Forward medical treatment elements will require rapid casualty evacuation in order to reduce shore-based footprint, free them to accept additional casualties or rapidly displace in support of the maneuver element."

Aircraft Available for MEDEVAC

Table 1 summarizes characteristics of the Marine Corps aircraft available for MEDEVAC. Because there are no dedicated aircraft for en route care, the aircraft are also used for other missions. These lifts of opportunity have no organic medical personnel or medical equipment assets.

Table 1. Aircraft Characteristics

Capability	MV-22	CH53D	CH53E	CH46E
Primary Function	Medium-lift equipment, supplies & personnel transport	Medium-lift equipment, supplies & personnel transport	Heavy-lift equipment, supply & personnel transport	Medium-lift assault helicopter
Crew (normal/combat)	4/4	3/3	3/3	4/5
Litters	12	24	24	15
Ambulatory	24	55	55	15
Force of blades	Extreme	Moderate	Moderate	Moderate
Temperature	Heating, No A/C	Heating, No A/C	Heating, No A/C	Heating, No A/C
Range (nm)	515	600 nm	540	132 nm
Speed		130 knots	150 knots	145 knots
Altitude (ft)	25,000	10,000	10,000	10,000
Communications		ARG-182 radio	ARG-182 radio	AN/ARG-210 radio
On-board oxygen generation	Crew only	No	No	No
External Load	10,000	7 tons	32,000	4,000
External Load Range (nm)	50	50 nm & return	50 nm & return	
All Weather	Yes	Yes	Yes	Yes

The newest Marine Corps helicopter, the MV-22 Osprey, tiltrotor aircraft was developed to fulfill multiple combat operational requirements, such as vertical take-off and landing. The MV-22 provides twice the speed, three times the cargo payload and five times the range of the CH-46 Sea Knight, one of the aircraft the Osprey will replace. Additionally, the MV-22 can be refueled in flight.

When time permits for the proper configurations, the MV-22 can hold 24 seats or 12 litters, the CH-53D and CH-53E can hold 55 seats or 24 litters, and the CH-46E can hold 14 seats or 15 litters. Of these 4 different airframes, the 53s and 46s are always capable of carrying wounded Marines via a "combat loaded" method of simply opening the door and getting onboard the best way possible. While this may be the only method available to rapidly extract casualties from a dangerous area, it does not provide for adequate medical care of the wounded.

Marine Corps aircraft identified above are unpressurized. The flight patterns employed by the pilot are often dictated by the tactical situation. Only the MV-22 has an on-board oxygen generating system for crew use.

Noise levels in all of the aircraft varies due to conditions such as engines, rotors, pressure altitude, and station location. Noise levels are unacceptable for unprotected personnel. All of the aircraft generally vibrate with the highest intensity during increased or maximum power application to the rotors. The exception is the MV-22, which reportedly has the highest intensity of noise and vibration during the transition from hover-to-level or level-to-hover flight. During level flight, the vibration in all aircraft reduces considerably, allowing for medical interventions like inserting an intravenous line.

Patients are positioned along the outboard side of the aircraft. Litter stanchions are configured along the outboard side so that the litters are against the wall. The distance between litters adheres to North Atlantic Treaty Organization standards of 28 inches lateral and 18 inches vertical clearance. Access to the bottom patient requires kneeling on the floor. Patients with monitoring equipment or treatment devices may necessitate the litter position above them remain empty.

Establishing Supply Requirements for ERCS

To achieve Marine Corps goals of an effective en route care system, NHRC and MCCDC sponsored an SME Review of Medical Evacuation Resource Requirements on April 2-5 2002 at the Naval Submarine Base, Ballast Point, San Diego, CA. SMEs included multidisciplinary triservice staff corps officers representing a variety of medical specialties. A list of participants is provided in Appendix B.

The aim of the conference was to determine the requirements for medical materiel and medical personnel for en route care during tactical medical evacuation. To meet this aim, the SMEs:

- Developed en route care patient treatment briefs, identified the clinical tasks to be performed by medical personnel during tactical medical evacuation of critically injured or ill casualties, and identified the medical supplies and equipment required to perform those clinical tasks.

- Recommended the type and mix of medical personnel required to perform the essential clinical tasks during tactical medical evacuation of critically injured or ill casualties.

Method of Supply Identification

To identify the supply requirements for en route care, NHRC used the systematic process that was designed in the early 1990s and has been used to review Marine Corps medical supply requirements for close to a decade. The NHRC approach identifies the medical tasks required to

treat patients with specific injuries and illnesses, and determines the consumable supplies and equipment required for each task. This process has been used to review supply requirements for several forward treatment facilities and functional areas; substantial reductions (approximately 30%) in the number of items, weight, and cube were achieved (Konoske, Galarneau, Pang, Emens-Hesslink, Gauker & Tropeano, 2000). By establishing the clinical requirement for each item pushed forward, the logistical burden carried by Marine Corps units was reduced and far-forward clinical capability enhanced. This research resulted in an extensive database that catalogs PCs and the tasks and supplies required to treat them. That database is the foundation for the Estimating Supplies Program (ESP) and for on-going NHRC modeling and simulation efforts (Tropeano & Konoske, 2002).

This method was slightly modified to determine the ERCS supply requirements. PCs were first grouped into en route care patient types (PTs), then the tasks required for treatment were identified, and consumable supplies and equipment for each task were determined.

Grouping PCs Into En Route Care PTs

The development of an effective en route care system depends on establishing pertinent clinical requirements during tactical evacuation of critically injured and ill casualties. Therefore, the critical clinical features of the anticipated patient population were identified first.

To start, the Joint Readiness Clinical Advisory Board (JRCAB) 317 patient condition (PC) codes were grouped into critical and noncritical categories. Critical was operationally defined as any PC that requires provider intervention within a 2-hour in-transit period of evacuation. Of the 317 PCs, 111 were identified as critical. From the critical group, the surgical PCs were identified and further grouped by the primary surgical procedure conducted to treat the PC by staff at the two Marine Corps forward surgical assets, FRSS and SC. This grouping yielded 4 PTs (the first four in Table 2).

Table 2. List of En Route Care Patient Types

Postsurgical Thoracic	Crush/Blunt Trauma
Postsurgical Staged Ex-Lap	Head Trauma
Postsurgical Vascular/Amputation	Medical – Acute Abdomen
Postsurgical Craniotomy	Medical – Anaphylaxis/Asthma
Burn >20% BSA	Medical – Cardiac Event
Class III & IV Hemorrhage/Shock	Medical – Environmental Emergency

Next, the 111 critical PCs were grouped according to the chief complaint each represented. The surgical PCs, although already assigned to a PT, were included a second time in this examination for two reasons: (1) the surgical PCs may first present at a BAS or Shock Surgical Triage (SST)/STP, and (2) not 100% of surgical candidate PCs receive a surgical procedure far forward. This situation occurs in triage and medical regulating circumstances where the wait time for a surgical slot exceeds the transport time to the next available surgical asset. This grouping yielded an additional 8 en route care PTs (the remaining PTs listed in Table 2). The patient populations of 4 medical assets, including BASs, SST/STPs, FRSSs, and SC operating rooms (ORs), are assigned to en route care PTs.

Table 3 shows how the en route care PTs map to the JRCAB PCs and from which medical asset each departs. A PC may be assigned to more than one PT, depending upon the medical asset from which the patient departs. For example, PC 5 is assigned to two different PTs: head injury and postsurgical craniotomy. These two different PTs reflect the varying approaches to en route care this patient requires from the departing facility. If a patient with PC 5 is evacuated from a BAS or SST/STP, the PT reflects the clinical requirements associated with a head injury that has not been

surgically addressed. If the same patient departs from FRSS or SC OR, then the en route care clinical requirements reflect those of a postoperative patient. In addition, some PCs are assigned to more than one PT within the same medical asset. For example, PC 159 has both a postsurgical thoracic and a postsurgical craniotomy PT assignment at FRSS. In this case, the two PT designations reflect the en route clinical requirements of a patient with multiple injuries and, therefore, multiple surgical interventions.

Table 3. PCs Assigned to En Route Care PTs

A – Postsurgical Thoracic
B – Postsurgical Ex-Lap
C – Postsurgical Vascular/Amputation
D – Postsurgical Craniotomy
E – Burn >20% BSA
F – Hemorrhage/Shock
G – Crush/Blunt Trauma
H – Head Injury
I – Med – Acute Abdomen
J – Med – Environmental
K – Med – Anaphylaxis/Asthma
L – Med – Cardiac

PC Code	BAS	SST/ STP	FRSS	SC OR	PC Code	BAS	SST/ STP	FRSS	SC OR
1	H	H	•	•	147	F	F	C	C
2	H	H	•	•	152	E	E	•	•
3	H	H	•	•	153	E	E	•	•
4	H	H	•	•	154	E	E	•	•
5	H	H	D	D	155	E	E	•	•
6	H	H	D	•	157	K	K	•	•
7	H	H	•	D	159	F	F	A, D	A, D
9	H	H	•	•	160	F	F	B, D	B, D
10	H	H	•	•	161	F	F	B, D	B, D
11	F	F	•	•	162	F	F	B, D	B, D
17	F	F	C	C	163	F	F	B, D	B, D
19	F	F	C	C	164	F	F	B, D	B, D
45	F	F	C	C	165	F	F	C, D	C, D
46	F	F	•	•	166	F	F	A, B	A, B
47	F	F	C	C	167	F	F	A, B	A, B
51	F	F	•	•	168	F	F	A, B	A, B
53	F	F	C	C	169	F	F	A, B	A, B
54	F	F	C	C	170	F	F	A, B	A, B
61	G	G	C	C	171	F	F	A, C	A, C
62	G	G	•	C	172	F	F	B	B
69	F	F	•	•	173	F	F	B	B
70	F	F	C	C	174	F	F	B	B
71	F	F	C	C	175	F	F	B, C	B, C
87	F	F	•	A	176	F	F	B	B
92	E	E	•	•	177	F	F	B	B
94	E	E	•	•	178	F	F	B, C	B, C
97	F	F	•	•	179	F	F	B, C	B, C
98	F	F	B	B	180	F	F	B, C	B, C
99	F	F	B	B	181	F	F	B, C	B, C
100	F	F	B	B	182	F	F	A, C, D	A, C, D
101	F	F	•	B	183	F	F	A, B, C	A, B, C

PC Code	BAS	SST/ STP	FRSS	SC OR
102	F	F	•	B
103	F	F	B	B
104	F	F	B	B
105	F	F	B	B
106	F	F	B	B
107	F	F	B	B
108	F	F	B	B
109	F	F	•	B
112	F	F	•	•
113	F	F	•	•
114	F	F	B	B
115	F	F	•	B
121	F	F	•	•
123	F	F	C	C
124	F	F	C	C
128	F	F	•	•
130	F	F	C	C
131	F	F	C	C
136	F	F	C	C
137	F	F	C	C
138	G	G	C	C
139	G	G	C	C
144	F	F	•	C
145	F	F	C	C
146	F	F	•	C

PC Code	BAS	SST/ STP	FRSS	SC OR
184	F	F	A, B	A, B
185	F	F	B	B
190	J	J	•	•
192	J	J	•	•
193	J	J	•	•
196	I	I	•	•
197	I	I	•	•
198	I	I	•	•
199	I	I	•	•
235	K	K	•	•
243	I	I	•	•
245	I	I	•	•
249	I	I	•	•
250	I	I	•	•
251	I	I	•	•
252	I	I	•	•
258	L	L	•	•
259	L	L	•	•
276	I	I	•	•
277	I	I	•	•
278	I	I	•	•
285	I	I	•	•
286	I	I	•	•
313	F	F	B	B
•	•	•	•	•

The PTs were further examined to determine the proportion of PCs assigned to a PT to the total number of PCs each medical asset is capable of treating. For example, BAS is capable of treating the 317 JRCAB PCs. As Table 4 shows, roughly one third of the PCs treated at the BAS (111 out of 317) are covered by an en route care PT. This proportion increases to almost one half at an SST/STP (111 out of 236). This higher proportion reflects the more restricted range of PCs treated at an SST/STP. BAS includes the Marine Corps sick-call assets and has the capability to address battle injury/trauma and disease and nonbattle injuries; in contrast, SST/STP are structured primarily as responses to trauma and focus largely on resuscitative procedures for the PCs representing seriously injured casualties. Therefore, the total number of PCs treated at an SST/SSP is considerably less than that of a BAS (236 vs. 317). Table 4 also shows that all PCs treated by the FRSS and SC OR are assigned to an en route care PT. This occurs because each patient treated at an FRSS or SC OR is considered critical and requires some form of en route care intervention during MEDEVAC.

The high proportion of BAS and SST/STP PCs that could not be directly mapped to an ERCS PT represent those patients requiring minimal clinical support during evacuation. This group of patients includes all sprains and strains, noncritical burns, most infectious diseases, and combat stress. The level of care required within these categories, such as the administration of pain management or sedative drugs, is provided within the scope of care of the ERCS PTs.

Table 4. Number of PCs Assigned to En Route Care PTs by MTFs

	BAS	SST/STP	FRSS	SC OR
PCs Covered by a PT	111	111	59	71
Total Number of PCs Treated at MTF	317	236	59	71
Percentage of PCs Treated Assigned to a PT	35.0%	47.0%	100%	100%

Identifying Tasks

Once the 12 en route care PTs were identified, a treatment brief describing the essential clinical features of each was prepared. The treatment briefs include information on patient acuity, vital signs, previous clinical procedures performed, and the anticipated condition of the patient prior to tactical evacuation.

From the treatment briefs, the clinical tasks required to be performed during en route care were developed and assigned to each PT. These task structures included the unique clinical interventions to be performed for each PT and represented the step-by-step sequence of care required to be performed by en route care attendants. A total of 65 unique tasks were identified as critical to the en route care mission. The task structures for each en route care PT are listed in Appendix C. Table 5 is an example of a task structure for the Postsurgical Vascular/Amputation PT.

Table 5. Task Structure for Postsurgical Vascular/Amputation PT

Task #	% of PT Receiving Task	Task Description
		Clinical Care Tasks
ZZ65	100%	Conduct Patient Hand-Off
ZZ97	100%	Assess/Instruct/Reassure Communications with Patient
ZZ66	100%	Provide Patient Protective Equipment
ZZ67	100%	Secure Patient to Litter/Air Frame
002	100%	Assess Patient Status
ZZ68	100%	Maintain Appropriate Skeletal Immobilization
ZZ69	100%	Monitor/Assess/Manage Blood Pressure/Mean Arterial Pressure
ZZ70	100%	Monitor/Assess/Manage EKG/Pulse
ZZ71	85%	Monitor/Assess/Manage Core Temperature
ZZ72	100%	Monitor/Assess/Manage Blood Oxygenation (SPO_2)
ZZ75	100%	Provide Visual/Audible Instructions/Reassurance
ZZ76	100%	Manage/Secure Lines & Tubes
010	100%	Assess Neurological Status
ZZ77	100%	Assess Airway/Breathing
ZZ78	100%	Assess Neurological Status
022	85%	O_2 Administration Equipment Set-Up
023	85%	O_2 Administration Continuous (Mask)
038	15%	Maintain Patient on Ventilator
082	100%	Measure/Record Urinary Output
ZZ19	85%	Warm Infusion Fluids
ZZ42	85%	Perform Active Patient Rewarming (Chillbuster)
050	50%	Administer Intravenous Fluid
ZZ58	50%	Pressure Infuse Intravenous Fluids
017	35%	Perform Suction (Oropharynx)
ZZ80	15%	Perform Suction (Endo-tracheal Tube/Tracheostomy)
073	10%	Perform Suction (Naso/Oro Gastric Tube)
087	35%	Reinforce Dressings
ZZ84	35%	Manage Saline Lock
ZZ85	100%	Reassess Tourniquet
145	100%	Administer Medications
		Change in Patient Status En Route
Z014	5%	Perform Rapid Sequence Intubation
Z038	5%	Hyperventilate Patient (Bag Valve Mask)
ZZ89	2%	Re-establish Intravenous Access (Angiocath)
Z103	1%	Re-establish Intravenous Access (Intraosseous)
Z027	2%	Cardiopulmonary Resuscitation
007	1%	Perform Cricothyroidotomy
ZZ03	1%	Perform Needle thoracostomy
ZZ90	2%	Manage Paralytic/Sedative Drugs (Ventilator Dependent Patients)
006	15%	Insert Oropahryngeal Airway
079	1%	Catheterization Foley
ZZ92	3%	Reverse Narcotic-Induced Respiratory Depression
ZZ64	10%	Sedate Agitated Patient
A6	3%	Apply Tourniquet
019	3%	Control External Hemorrhage
		Administrative & Equipment Support
ZZ95	100%	Collect & Manage Biowaste
197	100%	Patient Charting & Paperwork
ZZ96	100%	Assemble/Replenish/Resupply Materiel
ZZ98	100%	Preventive Maintenance, Checks, & Services of Equipment (PCS)
ZZ99	100%	Conduct Operational Risk Management (ORM)
Z100	100%	Manage Patient Personal Effects
Z101	100%	Conduct Patient Movement Item Exchange
Z102	5%	Troubleshoot Equipment

As Table 5 shows, the task structures for each PT were grouped into three categories. The first category consists of the clinical care tasks expected to be performed on a patient with the particular PT, including patient assessment, monitoring, and treatment. The second category consists of the tasks performed to treat an unexpected change in patient status during tactical evacuation, including emergency procedures. For example, in Table 5, task ZZ92 identifies the reversal of respiratory depression as an emergent procedure that could potentially be required in a patient with postsurgical vascular/amputation PT. The third category consists of the administrative and equipment support requirements surrounding the transport of a casualty in a tactical evacuation environment. These tasks apply equally to all patients and therefore do not vary across the 12 PTs.

In addition to the tasks themselves, an additional field named % Patients was included to indicate the relative probability that each of the tasks may be performed. This field was used to enhance the accuracy of resource requirement projections derived from the patient profiles; therefore, supply requirements associated with tasks with low assigned probabilities would not be overrepresented relative to those supplies assigned to high probability occurrence tasks. Appendix D lists all of the unique tasks that were assigned to one or more of the en route care PTs.

Determining ERCS Supplies

Once the PTs were identified and the task structures created, the equipment and consumable supplies required to perform each task were assigned. Appendix E shows the supply assignments for each en route care task. To be considered for en route care, each equipment and consumable item was required to conform to at least one of the following criteria: (1) currently considered a PMI by one or more of the services, (2) compatible with existing Marine Corps medical assemblages, and/or (3) JRCAB triservice standardized materiel. Furthermore, each piece of materiel is linked by an audit trail to an identified and validated en route care clinical requirement. A total of 95 items meeting these criteria were identified.

Table 6 lists the equipment items selected for ERCS, including those items considered PMIs. The objective of the PMI system is to support in-transit medical capability without removing equipment from patients during the transfer from sending facility to en route care personnel, and to exchange like PMIs without degrading capabilities. When a patient requires evacuation, the sending MTF provides the PMI required to support the patient during evacuation. En route care personnel then exchange like PMIs for those the sending MTF has provided with the patient. The handling and return of equipment to the evacuation system requires a reliable supporting logistics infrastructure to ensure that PMIs are available and serviceable. The plan for a PMI management system within the Marine Corps is still under development (Joint Publications).

Table 6. Equipment Items Identified for ERCS

National Stock Number	USP Nomenclature	Qty	Unit Issue	Total Lbs	Total Cube	Total Cost
6515014947971	Battery Pack Automated External Defibrillator	1	Ea	0.13	0.16	$195.00
NSN Pending	Battery Pack Rechargeable Thermal Angel [3]	2	Ea	12.66	0.12	$128.76
6530014617882	Bedpan Pontoon Style Plastic Autoclavable 12S	.17	Ea	0.26	0.01	$5.47
NSN Pending	Blanket Rewarming w/Charger Chillbuster[3]	2	Ea	5.00	0.16	$3,300.00
NSN Pending	Case Carrying Battery Thermal Angel[3]	2	Ea	0.76	0.01	$25.18
NSN Pending	Charger Battery Thermal Angel[3]	2	Ea	1.50	0.02	$48.92
NSN Pending	Clip Board Thigh Mount Flight w/Light 5x9 IN	2	Ea	0..66[5]	0.05[5]	$58.50[5]
6515014794272	Defibrillator Automated External w/Monitor[1]	2	Ea	10.4	0.56	$6,980.00
6515003344900	Forceps Hemostatic Halsted Mosquito Pt 5 In	2	Ea	0.20	0.02	$36.18
6515003377800	Forceps Tissue Adson 4.5 Inch Tweezer	1	Ea	0.08	0.01	$51.96
6515003447800	Handle Surgical Knife Blade Size 3 Narrow	1	Ea	0.07	0.01	$6.41
6515013417200	Holder Suture Needle Collier 5 Inch Straight	1	Ea	0.16	0.01	$11.30
6515014854362	Infusor Pump Intravenous Power M110B[1]	2	Ea	1.54	0.30	$3,400.00
6515013448487	Injector Tubex Reusable 1ML & 2ML Units	2	Ea	0.22	0.14	$11.54
6515014509790	Laryngoscope Set Softcase w/Light & Blades	2	Set	1.00	0.60	$107.00
6515014553888	Lantern Electric Head Mount Halogen/Krypton	2	Ea	1.20	0.06	$46.00
6540014553885	Lens Cover Red Lantern Electric Head Mount	2	Ea	1.10	0.24	$4.00
6530014325114	Litter Rigid Folding Raven Polypropylene[1]	2	Ea	22.0	0.04	$510.00
6515012796450	Monitor Oxygen Alarmed 6.75 x 3.5 Inch Size[1]	2	Ea	9.00	0.61	$1442.90
6515014322711	Monitor Patient Vital Signs Propaq Model 206[1]	2	Ea	50.0	4.80	$16,324.04
6545014586178	Otoscope & Ophthalmoscope Deluxe Soft Case	2	Sets	11.1	0.22	$560.00
6515014626143	Oxygen Admin Kit-Case/Regulator/Key[1]	2	Ea	40.0	2.50	$1512.00
6530013171131	Pad Heating Chemical Plastic Reusable	2	Ea	3.60	0.01	$4.94
NSN Pending	Power Cord Thermal Angel [3]	2	Ea	0.20	0.12	$35.14
6515012045394	Resuscitator Hand Op Bag Valve Mask	2	Ea	2.40	0.04	$215.22
6515003640920	Scissors General Surgical Mayo 7 Inch	1	Ea	0.35	0.01	$18.97
NSN Pending	SMEED Equipment Device Platform[3]	2	Ea	7.00[5]	0.90[5]	$53.00[5]
6515010394884	Sphygmomanometer Aneroid 300MM Hg	2	Ea	2.50	0.20	$24.82
6515013146694	Stethoscope Littman Classic II 28 Inch long	2	Ea	2.00	0.01	$98.82
6515014350050	Suction Apparatus Surgical Portable[1]	2	Ea	10.0	1.00	$3018.28
6530010422485	Urinal Male Patient Plastic Disposable 50S	.04[2]	Pkg	0.53	.026	$1.09
6530014551653	Ventilator Volume Eagle Univent 754 8x11 IN[1]	2	Ea	26.0	1.50	$12,201.80

[1] Patient Movement Item (PMI).
[2] .04 x 50 urinals per case = 2 urinals per ERCS (units are durable and reusable).
[3] Upon assignment of an NSN by JRCAB, item should be considered for designation as a PMI.
[4] .17 x 12 bedpans per case = 2 bedpans per ERCS (units are durable and reusable).
[5] Values are estimated.

It should also be noted that each piece of equipment was selected to be part of an overall system and, therefore, more than one piece of equipment may be assigned to a single clinical requirement. For example, in the case of the patient mechanical ventilation requirement, two pieces of equipment are identified to achieve that requirement. These include (1) the ventilator itself and (2) an oxygen monitor (associated consumable requirements are discussed in a following section). This oxygen monitor is added to the ventilation circuit and is used to monitor and alert when fraction of inspired oxygen (FiO_2) falls below a preset parameter. FiO_2 monitoring capability, considered a forward-deployed Marine Corps standard of care, is not resident in the ventilator currently in use and is required as an additional component. A similar situation exists with the fluid warming system. For the warming system to operate effectively, 4 pieces of equipment (in addition to the consumables) are required: (1) the power cord must be continuously attached to the (2) battery pack, which is enclosed in the (3) carrying/packing case, which must be connected to the (4) charger to be used either under AC or DC operating mode.

Table 7 lists the nonmedicinal consumables identified for ERCS. As with the equipment items, each piece of consumable materiel is linked by an audit trail to an identified and validated en route care clinical requirement.

Table 7. Nonmedicinal Consumable Items Identified for ERCS

National Stock Number	Item Nomenclature	U/I Qty	U/I	Qty p/U/I	Final Qty	Total Lbs	Total Cube	Total Cost
6515013215211	Airway Kit Emergency Cric 1S	1.00	Ea	1	1	0.20	0.05	$156.06
6515011676637	Airway Nasopharyngeal 30 FR 12S	0.17	Pkg	12	2	0.51	0.03	$10.07
6515011649637	Airway Pharyngeal Flange 30 FR 30S	0.07	Pkg	30	2	0.07	0.01	$4.79
6530011075798	Bag Biohazard Waste 36x24IN 200S	0.01	Pkg	200	1	0.17	0.01	$1.37
6510000583047l	Bandage Gauze Kerlix 4INx4YD 100S	0.06	Pkg	100	6	0.07	0.01	$6.33
6515006600011	Blade Surgical Knife Size No. 10 6S	1.00	Pkg	6	6	0.03	0.01	$1.15
6515010726380	Cannula Yankauer w/72IN Tubing 20S	0.10	Pkg	20	2	0.04	0.01	$5.96
6515014661488	Cartridge Infusor Power Disp 10S	0.20	Pkg	10	2	0.40	0.04	$59.00
6515004588411	Catheter Suction Whistle Tip 50S	0.04	Pkg	50	2	0.14	0.02	$1.99
6515013909627	Catheter & Needle Unit 14 GA 200S	0.01	Pkg	200	2	0.06	0.01	$4.71
6515013909654	Catheter & Needle Unit 18 GA 200S	0.01	Pkg	200	2	0.23	0.01	$3.94
6515001490104	Catheterization Kit Urethral 16 FR 1S	1.00	Ea	1	1	0.71	0.25	$6.78
6510014644424	Compress Instant Cooling Chem 80S	0.03	Pkg	80	2	0.08	0.01	2.37
6530014604782	Container Sharps Fold-Flat 5LT 25S	0.04	Pkg	25	1	0.02	0.01	$1.99
NSN Pending	Cover Warming Blanket Disposable 1S	2.00	Ea	1	2	0.01	0.01	$10.00
6515014661195	Circuit Ventilator Vinyl Disp 15S	0.14	Pkg	15	2	0.16	0.02	$11.20
6510000835573	Dressing Field White 4x7 Inch Ster 1S	4.00	Ea	1	4	0.56	0.02	$13.20
6515011535752	Electrode ECG Pregel 4.4CM Dia 25S	0.24	Pkg	25	6	0.72	0.06	$4.26
7530002815941	Folder Set Manila 8X11 Inch 100S	0.02	Pkg	100	2	0.19	0.01	$0.16
6515014530960	Intraosseous Infusion Set F.A.S.T 1™	1.00	Ea	1	2	0.40	0.40	$195.00
6515011050614	Intravenous Injection Set w/Roller 50S	0.04	Pkg	50	2	0.01	0.01	$3.21
6515013716467	Mask O_2 Nonrebreathe w/Tubing 50S	0.04	Pkg	50	2	0.07	0.39	$2.37
6515007542836	Needle Hypo 20GA 1.5IN Luer 100S	1.00	Pkg	100	100	0.76	0.04	$3.67
6510007755706	Pad Abdominal 7X8IN White 240S	0.01	Pkg	240	2	0.15	0.03	$0.44
6510007863736	Pad Isopropyl Alcohol 1.5x2IN 100s	1.00	Pkg	100	100	0.50	0.10	$0.69
6515014594403	Pad Defib Automatic External 2S	0.50	Pkg	2	1	1.63	0.58	$22.00
7520009357136	Pen Ball Point Retractable Black 12S	0.17	Pkg	12	2	0.36	0.14	$5.01
6510007219808	Sponge Surg Gauze 4x4IN Ster 1200S	0.01	Pkg	1200	10	0.16	0.02	$0.95
6515013948327	Stylet Endotracheal Tube Malleable 10S	0.10	Pkg	10	1	0.21	0.01	$4.36
6515011535733	Suture Nonabs Sz 1 Armed 60IN 12S	0.08	Pkg	12	1	0.06	0.01	$2.85
6515007540412	Syringe Hypo 10ML Luer Slip 100S	0.04	Pkg	100	4	0.23	0.02	$0.58
6515001491206	Syringe & Ndl 3ML 23 GA 1IN 100S	0.06	Pkg	100	6	0.15	0.01	$0.60
6510009268882	Tape Adhesive Woven 1INx10YD 12S	0.08	Pkg	12	1	0.11	0.01	$1.18
6515003830565	Tourniquet Nonpneumatic 50x1.5IN 1S	1.00	Ea	1	1	0.24	0.02	$5.18
6515008669073	Tube Drainage Thoracic 36FR 10S	0.20	Pkg	10	2	0.31	0.02	$3.43
6515001050759	Tube Tracheal Murphy 8.0MM 10S	0.10	Pkg	10	1	0.10	0.01	$2.03
6515010369034	Tube Tracheal Murphy 7.5MM 10S	0.10	Pkg	10	1	0.12	0.03	$2.30
NSN Pending	Warmer Fluid Thermal Angel Disp 1S	2.00	Ea	1	2	1.12	0.62	$130.00

Each piece of consumable materiel is matched to the appropriate equipment items to ensure compatibility both within ERCS, and between ERCS and the equipment stocked at each forward Marine Corps medical asset. For example, the ventilation circuits in ERCS match the ventilators used by both ERCS and Marine Corps MTFs; the warming blanket covers are compatible with the

electric warmers; and both the flexible whistle tip and the rigid tonsil tip suction catheters are compatible with the suction units.

Compatibility between consumable items was also recognized during the selection process. For example, only one of the two syringes is configured with an integrated needle. Syringe needle combinations facilitate the administration of medications and are used where feasible. However, the Marine Corps standardized 10-cc syringe-needle combination (Vanish Point®) was not selected for ERCS; while clearly an advantage in an en route environment, it was found to be incompatible with ERCS endotracheal (ET) tubes. Unlike other syringe-needle combinations, the Marine Corps unit does not have a removable, luer adapter needle hub, and cannot be used to inflated the balloon cuffs of the ET tubes. Therefore, ERCS includes both 10-cc syringes and individual, stand-alone needles.

The medicinal consumables identified for ERCS are shown in Table 8. To be included in ERCS, each medicinal item was required to have an identifiable clinical requirement, be considered part of an emergency or critical care medical protocol, and be resistant to changes in temperature gradient without the use of refrigeration. Furthermore, where feasible, premixed, preloaded syringes or cartridge-needle units were included, and the syringes were sized to match the dose ranges of the medicinals.

Table 8. Medicinal Consumables Items Identified for ERCS

National Stock Number	USP Nomenclature	Trade Name	En route Indication	Units	Total Lbs	Total Cube	Total Cost
6505013809548	Adenosine inj. 3mg/ ml 2 ml single dose vial	Adenocard	Cardiac	5 Vi	0.05	0.01	$65.30
6505011169245	Albuterol inhalation aerosol metered spray	Ventolin	Asthma	1 Ea	0.13	0.01	$3.18
6505007542547	Atropine Injection 0.4mg/ml 20ml vial	Atropair	Cardiac	1 Vi	0.14	0.01	$4.28
6505001009985	Aspirin 0.32gm100 tab	Anacin, Bayer	Cardiac	1 Bt	0.14	0.01	$1.49
6505001394460	Dextrose inj. 50% 50ml syringe/needle units	•	Hypoglycemia	1 Ea	0.44	0.03	$1.85
6505001375891	Diazepam inj. 5mg/ml 2ml syringe/needle	Valium	Anxiety/ Seizure	3 Ea	0.08	0.01	$3.77
6505001487177	Diphenhydramine 50 mg/ml 1ml syringes	Benedryl	Anaphylaxis	2 Ea	0.05	0.01	$3.32
6505011231060	Dopamine inj 40mg/ml 10ml cartridge/ndl unit	Intropin	Vasopressor	Provided as needed by sending MTF			
6505007341026	Epinephrine inj. 1ml 1:1000 ampule	Adrenalin	Cardiac/ Anaphylaxis	3 Ea	0.08	0.01	$2.55
6505010932384	Epinephrine inj.1mg/ml 1:10000 10ml syringe	Adrenalin	Cardiac	10 Ea	1.60	0.14	$15.09
6505012811247	Hetastarch in NaCl 500ml bag	Hespan	Volume Expander	4 Ea	4.00	0.13	$73.79
6505011561797	Lidocaine 5ml syringe	•	Anesthetic	10 Ea	1.13	0.09	$23.74
6505011947265	Lidocaine injection & Dextrose 500ML bag	•	Cardiac	1 Ea	1.47	0.05	$7.81
6505011253253	Mannitol inj 25% 50ml single dose vial	Osmitrol	Dieresis	Provided as needed by sending MTF			
6505008556984	Meperidine inj. 10mg/ ml cartridge/needle unit	Demerol	Analgesia	10 Ea	0.27	0.01	$6.97
6505011080808	Methylprednisolone injection 1000mg	Solumedrol	Asthma/SCI	2 Ea	0.24	0.01	$10.40
6505013092742	Metoprolol inj1mg/ml 5ml ampule	Lopressor	Cardiac	2 Ea	0.06	0.01	$4.77
6505012444736	Midazolam inj. 5mg/ml 1ml vial	Versed	Analgesia/ Sedative	5 Ea	0.09	0.01	$31.51
6505001490113	Morphine inj. 10mg/ml 1ml cartridges	•	Analgesia	10 Ea	0.28	0.01	$4.96
6505000797867	Naloxone inj. 0.4mg/ml 1ml ampule	Narcan	Narcotic antagonist	5 Ea	0.06	0.03	$2.43
6505012463781	Nitroglycerin aerosol 14gm container	•	Cardiac	1 Ea	0.08	0.01	$48.05
6505001325181	Oxygen 95gl D size	•	Hypoxia	2 Ea	26.0	0.60	$373.74
6505006807352	Promethazine inj. 25mg/ml 1 ml ampule	Phenergan	Anti-emetic/ Anxiety	4 Ea	0.06	0.01	$1.94
6505013329024	Phynytoin inj 50 mg/ml 5 ml vial	Dilantin	Seizure control	Provided as needed by sending MTF			
6505014623025	Ringers Lactated Injection 1000ml bag	•	Volume Expander	3 Ea	1.64	0.03	$2.80
6505014562380	Scopalamine transdermal 1.5mg	Transderm Scop	Anti-emetic	4 Ea	1.55	0.55	$34.59
6505002165370	Sodium Bicarbonate 50ml syringe	•	Alkalization	5 Ea	2.20	0.15	$9.12
6505014622436	Sodium Chloride Inj. 0.9% 1000ml bag	•	Volume Expander	6 Ea	4.5	0.06	$8.41

The final weight, cube, and estimated cost for each ERCS package of materiel are shown in Table 9. When PMIs are excluded from the calculations, substantial reductions are observed for each of the measures. For example, the weight of ERCS decreases from 276 to 147 pounds when PMIs are tallied separately. Even more dramatic reductions occur when PMIs are excluded from calculation of total cube and total cost of ERCS.

Table 9. Weight, Cube, and Cost of ERCS Supplies

	Total Items	Total Weight	Total Cube	Estimated Cost
PMI Equipment	7	128.9	8.8	$43,857.02
All Equipment	32	223.6	14.7	$50,417.25
All Consumables	63	52.9	4.7	$1,337.01
Total w/ PMI	95	276.5	19.4	$51,754.26
Total w/o PMI	88	147.6	10.6	$7,897.24

Recommendations for ERCS Personnel

In addition to determining ERCS medical material requirements at the conference, SMEs identified the type and mix of medical personnel required to provide en route care during tactical medical evacuation. In identifying personnel requirements, SMEs first determined the tasks required for en route care (see page 6) and then determined how often each task was performed for a patient stream (i.e., MAA SOA 2012). By analyzing the tasks required for en route care, the expected frequency of those tasks, and the skills required to complete those tasks, the SMEs recommended the composition of the ERCS Team.

Clinical Task Frequency

The two-person ERCS Team must be capable of meeting the clinical needs of two critically injured or ill casualties for each MEDEVAC mission. MAA SOA 2012 was used to determine the frequency each clinical task was performed. The MAA scenario included the number of each PC and the patient location and movement expected during the scenario. Using Table 3, each PC in the MAA scenario was assigned to an en route care PT depending on the location of the sending facility. For example, in the MAA scenario there were eight PC 54 Wound/forearm/open/fracture/nerve/vascular. Three of those casualties were treated and evacuated from FRSS. These casualties would receive en route care identified in the Postsurgical Vascular/Amputation PT (see page C-4 for task list). Five casualties were treated and evacuated from BAS, STP, or SST. Those casualties would receive the en route care described in the Hemorrhage and Shock PT (see page C-7 for task list). Table 10 shows the percentage of each PT in the MAA scenario.

Table 10. Percentage of Each PT in the MAA Scenario

Patient Type	Percent in Scenario
Hemorrhage/Shock	48.59
Postsurgical Ex-Lap & Postsurgical Vascular/Amputation[1]	14.08
Med – Acute Abdomen	14.08
Postsurgical Vascular/Amputation	10.56
Postsurgical Thoracic & Postsurgical Vascular/Amputation[1]	3.52
Postsurgical Thoracic & Postsurgical Ex-Lap[1]	2.82
Head Injury	2.11
Med – Cardiac	1.41
Crush/Blunt Trauma	0.70
Med – Anaphylaxis/Asthma	0.70
Postsurgical Vascular/Amputation & Postsurgical Craniotomy [1]	0.70
Postsurgical Thoracic & Postsurgical Ex-Lap & Postsurgical Vascular/Amputation[1]	0.70
Postsurgical Craniotomy	0.00
Burn >20% BSA	0.00
Med – Environmental	0.00
Postsurgical Ex-Lap	0.00
Postsurgical Thoracic	0.00

[1]Several multiple injury wound PCs receive more than one surgical procedure. These PTs were developed to account for tasks that are shared across surgical procedures.

Each PT has a set of clinical tasks and each task has a likelihood to be performed (%PTS). The percentage each task was expected to be performed during the scenario was calculated by multiplying the %PTS by the probability of the PT occurring in the scenario.

Table 11 presents the percentage of PCs in the MAA scenario that received each task. As previously mentioned, tasks are categorized into three groups: clinical tasks, change in patient status tasks, and administrative and equipment support tasks. (See Appendix F for a list of aviation-related tasks. These tasks were not directly addressed at the conference.) Only clinical tasks and change in patient status tasks are addressed here. Table 11 shows that in the MAA scenario tasks requiring assessment of patient status or monitoring patient vital signs were expected to be performed on a high percentage of PCs while tasks performed in response to change in patient status, such as emergency cricothyroidotomy, are done less frequently. Though not performed frequently, change in patient status tasks can mean the difference between life and death for a critically injured or ill casualty. All members of the ERCS Team should be proficient in the performance of the more frequently occurring tasks, while at least one member should be able to accomplish those critical yet infrequently occurring tasks. However, all tasks should be regarded as critical to the patient outcome regardless of how frequently they are performed.

Table 11. Percentage of PCs in the MAA Scenario Receiving Each Clinical Task

Task Number	Task Name	% of PCs in MAA Scenario
	Clinical Care Tasks	
002	Assess Patient Status	100.00
ZZ77	Assess Airway/Breathing	100.00
010	Assess Neurological Status	100.00
ZZ76	Manage/Secure Lines & Tubes	100.00
ZZ69	Monitor/Assess/Manage BP/MAP	100.00
ZZ70	Monitor/Assess/Manage EKG/Pulse	100.00
ZZ72	Monitor/Assess/Manage $SP0_2$	100.00
ZZ66	Provide Patient Protective Equipment	100.00
ZZ67	Secure Patient to Litter/Airframe	100.00
ZZ65	Conduct Patient Handoff	100.00
ZZ75	Provide Visual/Audible Instruction/Reassurance	100.00
ZZ97	Assess/Instruct/Reassure Communications w/Patient	98.59
082	Measure/Record Urinary Output	97.89
ZZ71	Monitor/Assess/Manage Core Temp	96.30
145	Administer Medications	89.16
022	O_2 Administration Setup Equipment	82.01
023	O_2 Administration Continuous (Mask)	82.01
ZZ19	Warm Infusion Fluids	81.44
050	Administer IV Fluid	80.18
ZZ42	Active Patient Rewarming (Chillbuster or Similar)	79.51
ZZ85	Reassess Tourniquet	78.17
ZZ58	Pressure Infuse IV Fluid/Blood Products	77.75
038	Maintain on Ventilator	73.59
087	Change/Reinforce Dressings	71.94
017	Perform Suction Oropharynx	55.25
ZZ74	Monitor/Assess/Manage Central Venous Pressure	51.06
073	Perform Suction (NG/OG Tube)	42.22
ZZ68	Maintain Appropriate Skeletal Immobilization	32.39
ZZ78	Assess Neurovascular Status	30.99
ZZ80	Perform Suction (ET Tube/Tracheostomy Tube)	29.86
ZZ73	Monitor/Assess/Manage CO2	28.56
062	IV Infusion Blood Products	26.06
ZZ84	Manage Saline Lock	21.56
ZZ83	Manage Abdominal Drains	17.61
ZZ82	Collect & Perform Autotransfusions	8.46
ZZ81	Manage Chest Tubes Including Suction	7.04
ZZ86	Manage Subdural Drains	2.11
ZZ88	Maintain Cooling/Rewarming Procedures (packs)	0.00
ZZ87	Maintain Dry Dressings	0.00
ZZ79	Assess BSA to Calculate Fluid Requirements	0.00
	Change in Patient Status Tasks	
006	Insert Airway (Oro/Naso Pharyngeal)	13.45
ZZ64	Sedate Agitated Patient	6.69
ZZ92	Reverse Narcotic Induced Respiratory Depression	5.36
Z014	Perform Rapid Sequence Intubation	5.00
Z038	Hyperventilate Patient	5.00
Z027	Cardiopulmonary Resuscitation	2.64
ZZ89	Re-establish IV Access (Angiocath)	2.64
Z103	Re-establish IV Access (Intraosseous)	2.64
ZZ90	Management of Paralytic/Sedative Drugs	2.41
A6	Apply Tourniquet	2.35
019	Controls External Hemorrhage	2.35
ZZ03	Perform Needle Thoracostomy	1.35
079	Catheterization Foley	0.98
007	Performs Emergency Cricothyroidotomy	0.86
ZZ93	Manage Seizing Patient	0.16
ZZ91	Reinsert Chest Tubes	0.14
ZZ94	Emergent Escharotomy	0.00

Administrative and Equipment Support Tasks

Table 12 lists the tasks required to complete the administrative and equipment support tasks. These tasks support or make in-flight clinical interventions possible. For example, in keeping with the ORD, the ERCS Team must perform preventive maintenance and operator-level maintenance of equipment to ensure the safety of patients during evacuation. In addition, the ERCS Team must conduct a PMI exchange with the receiving MTF.

Table 12. Administrative and Equipment Support Tasks

Task Number	Task
ZZ96	Assemble/Replenish/Resupply Material
197	Charting & Paperwork – Patient Specific
ZZ95	Collect & Manage Biowaste
Z102	Troubleshoot Equipment
ZZ99	Conduct Operational Risk Management (ORM)
Z101	Conduct PMI Exchange
Z100	Manage Patient Personal Effects
ZZ98	Preventive Maintenance, Checks and Services of Equip

Recommendations for Personnel Type and Mix

The SMEs recommend the following for the type and mix of medical personnel on the ERCS Team: The 2-person ERCS Team should consist of a combination of flight surgeons, critical care nurses, and EMT P/M level technicians. The 2-person team could be: (1) a flight surgeon plus a critical care nurse, (2) a flight surgeon plus an EMT P/M level technician, or (3) a critical care nurse plus an EMT-Paramedic level technician. Any of the two-person teams could be augmented with a third medical provider if required by the number or clinical condition of the casualties.

Aircrew familiarization and critical care nursing experience were identified as essential characteristics of the ERCS Team members. Because of the tactical nature of the evacuation, panel members emphasized the importance of ERCS Team members being familiar with the aircraft and feeling comfortable in that environment. Panel members also stressed the need to have experienced critical care providers who can assimilate change in patient status information so appropriate critical care can be determined.

Issues Related to En Route Care

Logistics

Evacuation personnel, whether on the ground or in the air, require training and support by documented standard operating procedures, communication, and guidance when communication is lost or they are otherwise isolated. Therefore, four issues related to the deployment of ERCS need to be addressed.

First, en route care personnel may require guidance for unfamiliar clinical and aircrew tasks. The training for en route care personnel should include the performance of both critical care clinical tasks as well as tasks associated with being a member of the aircrew.

Second, explicit procedures for collecting patient treatment data from the sending facility as well as during transport should be developed. Accurate, legible, and complete patient documentation is required for comprehensive patient care; communication between the sending and receiving clinicians should cover the clinical state of the patient, treatment received, and the treatment

required. Information regarding the patient assessment prior to evacuation, and details of the evacuation and handover should also be included. Clear, concise details of the evacuation process should include the mode of evacuation, departure time, monitoring, vital signs, treatments, and interventions en route. Ideally patient evacuation data should be entered into a dedicated database to enable analysis of evacuations undertaken and to facilitate quality assurance.

Third, command, control, and communication standard procedures need to be addressed. Among other things, ERCS requires the evaluation of ground and air evacuation assets, logistical procedures that track the location of the personnel assigned, and assessment of the realistic availability of aircraft. Rigorous command, control, and communication procedures are required to run an efficient ERCS.

Fourth, although every attempt has been made to standardize PMIs among various forward medical treatment facilities for ERCS, additional effort should focus on ensuring that PMIs can stand alone and are interoperable among the services and aboard all evacuation vehicles. This can be accomplished by developing and utilizing a system to certify, track, maintain, and recover PMIs. In addition, en route care equipment (and personnel) must be actively managed to return them expeditiously to their origin.

Future Directions

An important precept is that casualty care begins with the first responder or corpsmen and continues whether the casualty is being evacuated by ground vehicles or by aircraft. Care should not fall below a certain level; therefore, it is more beneficial to look at patients as being on a continuum of care versus looking at them being treated at each individual functional area. Acknowledging this notion of a continuum of care, there is clear operational need to provide medical planners with a concept of integrated aeromedical evacuation to reach Marine Corps goals of high mobility, rapid augmentation, and better interoperability.

The Tactical Medical Logistics (TML) Tool, recently developed by NHRC (under MARCORSYSCOM sponsorship), provides the medical planner and medical provider the ability to evaluate various courses of action and determine readiness and medical capability in support of the warfighter. The en route care requirements could be integrated into TML to evaluate operational risk of various medical facility configurations, including medical evacuation capability. Potential users include Navy, Marine Corps, and other service medical regulators, planners, and providers.

However, to determine more accurately the operational risk for MEDEVAC, additional data would be required. Data collection would include the amount of time the casualty is unattended, the medical skill level and mix of MEDEVAC crew members, clinical stability of the patient, safety of the environmental conditions (night, weather), clinical capability of the receiving site, and change in condition that make assumptions invalid.

The development of the modeling capability including medical assemblages will help ensure the successful evacuation of patients across the intertheatre and intratheater continuum by any mode of transportation and without clinical degradation. Enhanced en route care and evacuation capabilities will facilitate the development of the flexible and adaptable operational medical forces that are envisioned in JHSS 2010.

Conclusion

Recognizing the increasing reliance on en route care, the Marine Corps has launched an effort to design the En Route Care System. The Subject Matter Expert Review of Medical Evacuation Resource Requirements, sponsored by NHRC and MCCDC, has made significant strides in developing ERCS. This conference resulted in the identification of (1) the equipment and

consumable supplies required for ERCS during tactical medical evacuation, and (2) the skills and personnel required for ERCS.

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Appendix A

Draft of the En Route Care
Operational Requirements Document

This draft was used at the time of the SME Review in April 2002.
For the most current version of the ORD,
go to www.cdts.marcorsyscom.usmc.mil/cdts/cdts.nsf

OPERATIONAL REQUIREMENTS DOCUMENT FOR THE EN ROUTE CARE SYSTEM (ERC) DRAFT

1. GENERAL DESCRIPTION OF OPERATIONAL CAPABILITY. The En Route Care system will provide the capability to rapidly configure USMC medium lift aircraft for the transport of critically ill but stabilized casualties from facilities ashore to facilities at sea or ashore. It includes the personnel, equipment and supplies necessary for the medical management of casualties during transport.

a. Defense Planning Guidance. This requirement supports the sub-element Health Service Support of Defense Planning Guidance dated April 2000. Battle casualties will be handled using rapid stabilization, far-forward surgery, essential care and hospitalization in theater, and rapid evacuation out of theater to more definitive levels of care as defined by theater evacuation policies.

b. Mission Area. This requirement relates to the 28 February 1997 Mission Area Analysis 45, Health Services, Category I deficiency stating that United States Marine Corps (USMC) Health Service Support (HSS) units as currently configured are too heavy and lack the mobility needed to support Operational Maneuver from the Sea (OMFTS).

c. System Description. The En route care system consists of an En route care technician, medical equipment and consumable supplies, and medical treatment and communication protocols.

d. Operational Concept

(1) OMFTS and Ship to Objective Maneuver (STOM) require that shore based Combat Service Support assets be as light and mobile as practical. Naval Force Health Protection 21 (NFHP-21) and the Joint Health Service concept, Force Health Protection (FHP), specify that En route care is a critical component of Combat Casualty Care. Over the horizon force projection with operational reach approaching 200 nm will increase the distances and transit time involved in casualty evacuation and increase the risk of in-transit clinical degradation of severely wounded casualties. Forward medical treatment elements will require rapid casualty evacuation in order to reduce shore-based footprint, free them to accept additional casualties or rapidly displace in support of the maneuver element.

(2) The En route care system will be employed when the tactical situation requires prompt transport of critically injured but stabilized casualties from forward collection and treatment elements to the shore or sea based treatment facilities. Less critically injured, but stable casualties will continue to be transported under current protocols.

(3) The En route care system will be assigned to the Marine Wing Service Support Group. En route care technicians and supporting equipment will be staged at forward operating bases or on the sea base. On notification of an urgent casualty transport and assignment of an evacuation platform, the En route care technician will board the aircraft and assist the crew in configuring the cabin for transport of litter casualties. Upon arrival at the transferring facility, the technician will take report on the casualty and assist in loading the casualty on the aircraft. The technician will exchange or replace any equipment items provided by the transferring facility. While in transit, the technician will monitor the status of the casualty and apply clinical interventions as directed by pre-approved protocols or by remote medical supervision. The En route care technician will have the capability to transmit clinical data to the receiving facility via on-board communication devices. The technician will only perform those procedures necessary to prevent clinical degradation while in transit.

(4) Upon arrival at the receiving facility the En route care technician will accompany the patient until full transfer is effected. The aircrew will remove and off load any En route care items that do not accompany the patient. Following transfer, the En route care technician will recover all En route care items, reconstitute consumables from the gaining facility and report his availability for further missions or transport to originating station

e. Support Concept. The En Route Care System will be supported within the existing Department of the Navy maintenance concepts, using common tools and general-purpose test equipment to the maximum extent possible. To the greatest extent possible, the En route Care System will be equipped with USMC standard stock items.

f. Mission Need Statement (MNS). The MNS for Echelon I and II Health Service Support (HSS) (NO. MED 217), dated 30 November 1995, validates the requirement for an En route Care System.

2. THREAT.

a. Threat to be countered. Death and disability resulting from trauma injuries incurred during military operations.

b. System Specific Threat. There is no specific threat identified to the En route Care System.

3. SHORTCOMINGS OF EXISTING SYSTEMS

a. Current. The HSS assets currently available within the MAGTF cannot support intensive services to critically injured Marines during aerial transport.

b. Projected. There is no known USMC HSS system planned or in development that meets the requirement for medically supervised transportation of severely injured Marines over the times and distances required by OMFTS/STOM.

4. CAPABILITIES REQUIRED. The capability to provide skilled medical attendance of severely injured casualties during transport in order to prevent clinical degradation and improve clinical outcomes. The En route care system consists of a highly trained technician, medical equipment, and

treatment and communication protocols in order to maintain the clinical stability of a severely injured casualty during transport.

a. System Performance. Upon notification the En route care technician must be able to configure the platform for patient transport within 10 minutes and be provide medical supervision for up to two critically injured casualties for periods of up to two hours. The system must allow for de-configuration from the casualty transport mission in not more than 10 minutes.

b. (1) Concept of Employment

(a) Mission Profiles. The En Route Care System will provide a transport capability for critically injured casualties. The system may be required to transport recently postoperative patients from the Surgical Company or the Forward Resuscitative Surgery System, or it may transport severely injured casualties who will require surgery upon arrival the destination. Additional secondary missions may include providing medical support to Tactical Recovery of Aircraft and Personnel (TRAP) missions and support to Non-combatant Evacuation operations (NEO). The En Route Care System is equipped and staffed to provide only minimal, essential monitoring and care to adult casualties during transport.

1 The En Route Care System is an element of the ACE and will be deployed to augment medium lift platforms to support movement of critically injured casualties

2 The En Route Care System is flexible, adaptable, and tailorable. The En Route Care System will be operable in hot and cold weather environments.

(b) Mission Essential Functions

1 Provide medical supervision up to 2 critically injured casualties

2 Provide post- operative care and monitoring.

3 Operate in the full range of environmental conditions in which Marines are expected to deploy.

4 Allow for rapid cabin configuration and re-configuration.

6 The safety policy and program should be designed to cover all operations and take into consideration all conditions peculiar to the specific operation of the system. The program includes the establishment of safety rules, procedures, and supervision.

(c) Employment Tactics. The En Route Care System will be used by Navy Medical personnel to provide medical supervision during casualty evacuation. Requests for priority casevac will be made using standard LOGREC procedures. The HDC/DASC will prioritize the request and commence

mission planning. The DASC/HDC will have visibility of the locations and readiness of all En route care attendants and will direct an airframe to rendezvous with the technician for further movement to the transfer point. Standard medical regulating procedures will select the preferred destination.

1 Fully operational on any USMC medium lift airframe within 5 (objective) to 10 (threshold) minutes after arrival of the aircraft.

2 Supplied for two patients for not less than two hours transport.

(d) Employment Prerequisites. The required level of skill and initial and sustaining training of the attendant must be determined, and if additional training programs or changes to force structure are required these must be instituted prior to IOC.

(e) Control. Control of the En route care system will rest with the ACE, and will be deployed in General Support of the MAGTF.

(f) Environmental Conditions. The En route care system must be operable and maintainable under all conditions of climate and terrain to which Marines deploy.

(g) Information Warfare. En route care system information and communication systems will operate under the same information warfare threat environment as the unit it supports.

(a) Issue. The En route care system's data systems prevent unauthorized disclosure of medical information, are secure, present no additional risk of exploitation by an adversary, and they comply with all the requirements for DoD information systems.

1 Parameter. Computing and data systems shall comply with the Defense Information Infrastructure Common Operating Environment standards, and comply with all requirements for safeguarding medical information as required by the Theater Medical Information Management Program (TMIP).

(2) Mission Performance Objectives

(a) Issue (Critical). The En route care system provides equipment and supplies for a minimum of two patients for a period of not less than two hours, including aerial flight in a non-pressurized transport.

1 Parameter. (Critical, Key Performance Parameter (KPP)): The system shall provide equipment and supplies for a minimum of 2 casualties who require mechanical ventilation, physiological monitoring, intravenous therapy, medication administration, supplemental oxygen therapy, airway maintenance, head and limb immobilization and suction. Note: Determination of medical material types and quantities required to support the En route care system is considered an essential element of the development effort of the En route care system.

(b) Issue (Critical). The En route care system is readily transportable and rapidly employable.

1 Parameter. (Critical, KPP). The En route care system shall be transportable by one person for 100 yards.

2 Parameter. The En route care system shall have a set-up time (time from placement on the aircraft to full operational capability) of less than 10 minutes (threshold), 5 minutes (objective) by one person.

3 Parameter. The En route care system shall have a strike time (time to break down the assemblage and prepare it for offload from the aircraft) less than 10 minutes (threshold), 5 minutes (objective) by one non-medical person.

4 Parameter. The En route care system equipment shall be certified for airworthiness in all USMC and USN light and medium lift aircraft

b. Logistics and Readiness

(1) Logistics Supportability Objective

(a) Issue. The En route care system is logistically supportable.

1 Parameter. To the greatest extent possible, equipment and consumables will be selected that are common to land based treatment platforms.

2 Parameter. Be compatible with ground and aircraft power systems.

(2) Reliability, Availability and Maintainability Objective

(a) Issue. The En route care system is reliable.

1 Parameter. The En route care system shall have a 90 percent (threshold)/95 percent (objective) probability of completing a mission without a major component failure.

c. Other System Characteristics

(1) Survivability and Vulnerability Objective

(a) The En route care system is not required to be hardened to withstand the effects of conventional weapons or nuclear weapons

(b) Issue. None

5. **PROGRAM SUPPORT**

a. Companion Operational Requirements Documents. Forward Resuscitative Surgery System, Mobile Medical Monitor.

b. Maintenance Support Planning. Organizational and intermediate level maintenance should be in place to support Initial Operational Capability (IOC) in Fiscal Year (FY) 04 and Full Operational Capability (FOC) in FY 05.

c. Organizational Level Support. All preventive and corrective maintenance will be conducted at the lowest level of support. First level maintenance will be performed by using unit operators.

d. Intermediate Level Support. The tasks will include major repairs to the EN ROUTE CARE SYSTEM. Third echelon maintenance will be provided by the FSSG.

e. Depot Level Support. None anticipated.

f. Support Equipment

(1) Standard Support Equipment. Sufficient repair parts must be stocked. Maintenance and operator manuals must be published. Initial maintenance and support training must be conducted prior to issuing the En route care System to the operating forces.

(2) Test and Fault Isolation Capabilities

g. Human Systems Integration

(1) Manpower Constraints

(a) Operators. Medical department personnel assigned to the FMF will operate the En route care system. Additional, specialized training may be required. The implementation of this capability should not affect total numbers of Naval Personnel assigned to the ACE.

(b) Maintenance Personnel. The En route care system medical equipment will be maintained at the organizational and intermediate level by a qualified Biomedical Equipment Systems Technician (HM 8479). Maintenance of non-medical En route care equipment will be performed by organizational and intermediate level repair personnel.

(c) Support Personnel. Support manpower requirements will be determined during the integrated logistics support analysis conducted by the Marine Corps Systems Command.

1 Concept. Initial training and familiarization training for Navy Medicine personnel will occur at Naval Medical and Naval Aviation Service Schools. Specialized and sustainment training will be provided at locations to be determined.

(2) Organizational Impact Objective

(a) Issue. Fielding the En route care system may require specialized training and/or changes to NEC's for medical personnel currently assigned to the ACE, but will not require any additions to manning levels.

(3) Personnel Selection and Training Objective

(a) Issue. The En route care system will require personnel who are Naval Aircrew qualified and who have obtained such additional training or certifications necessary to provide medical supervision to critically injured casualties.

(4) Human Factors and Safety Objective

(a) Human Factors. The En route care system's Human Factors will support operation, maintenance, and support of the system.

1 Parameter. The En route care system design will support full body access and visualization of the casualty during transport.

(b) Safety Objective. The En route care system does not present major safety or health hazards while being operated, maintained or supported.

1 Parameter. The En route care system shall contain no hazards that will cause death, severe occupational illness, or irreversible damage to health, beyond those hazards usually and customarily encountered in transport of critically injured casualties. The system will not cause any hazard to the aircraft or aircrew.

h. Computer Resources. As required to support the primary mission. Active or passive automated devices may be employed to automatically or semi-automatically titrate medical inputs (oxygen, resuscitation fluids and medications, etc.) in response to changes in physiologic status.

i. Other Logistics Support Considerations. The En route care system may require patient transfer to other service evacuation systems. Commonality of equipment is a desired characteristic.

j. Command, Control, Communications, Computers and Intelligence (C4I) Integration. Any computer software employed by the system must be certifiable to DII COE level seven. The En route care system must be capable of incorporating current and future standard MAGTF medical C4I technology in order to provide patient care, medical logistics and casualty evacuation.

k. Transportation and Basing Support

(1) Movement

(a) Inter-theater. The En route care system must be deployable by all DoD strategic lift assets.

(b) Intra-theater. The En route care system must be transportable by all USMC light and medium lift logistic aircraft.

(2) Lift Constraints. The EN ROUTE CARE SYSTEM must not require powered MHE for loading and off loading in a tactical environment.

(3) Training Locations

(a) Basing. To be determined

(b) Associated Facilities. None.

(4) Main Operating Bases

(a) Basing. Primary basing will be at the MWSS supporting MAGTF operations and with sea and land based prepositioned equipment.

(b) Associated Facilities. None.

(5) Forward Operating Bases

(a) Basing. The En route care system may be staged at Forward Operating Bases.

(b) Associated Facilities. None.

l. Standardization, Interoperability and Commonality

(1) Interoperability and Compatibility Objective

(a) Issue. Joint Use. The En route care system provides a health service capability that supports smooth transfers of patient care between and among a U.S. Army, U.S. Navy, U.S. Air Force, U.S. Coast Guard, and civilian agencies that provide a medical and Aeromedical evacuation capabilities.

(b) Issue. North Atlantic Treaty Organization (NATO) Cross-Servicing. The En route Care system provides a health service capability that supports and/or augments NATO and Combined (Allied) Forces HSS concepts of operations.

(c) Issue. The En route care systems must be compatible with standard garrison electrical sources and with DoD mobile electric power sources.

(d) Issue. The En route care system must be capable of adapting to a variety of power sources.

m. Mapping, Charting and Geodesy Support. None.

n. Environment Support. None.

6. FORCE STRUCTURE

a. Number of Systems. Sixty (60)

b. Number of Subsystems. None.

7. SCHEDULE CONSIDERATIONS

a. Initial Operating Capability (IOC). The IOC will be achieved when the each MEF has received six and sufficient repair parts are in place to support operations. Additionally, the assigned En route care attendant must receive required training as determined by the development effort. T/O and associated manning documents must reflect any changes in NEC.

(1) IOC. The En route care system IOC will be FY 2004.

(2) Impact if IOC is not met. Marine Corps forces in combat may suffer a higher mortality rate than would be the case if the En route care system were employed.

b. Full Operating Capability (FOC). The FOC is reached when all En route care systems have been placed in service and operator training has been completed at the organizational through depot level.

(1) FOC. The FOC for the En route care system is FY 2004.

(2) Impact if FOC not met. The CSS element will be unable to provide support for high tempo maneuver warfare.

8. COST

En route care systems will cost less than $25K per set.

APPENDIX A
REFERENCES

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Appendix C

Task Profiles for the
12 En Route Care Patient Types

Postsurgical Thoracic

Patient will present with litter, blanket, 100% w/mechanical ventilation, 100% neuromuscular blockade, venous access (angio-cath, or lock), 25% will have a central line, 100% foley, NG/OG tube, empty pleur-evac provided by sending facility. 75% will be unconscious. Patient will be coagulopathic, hypothermic & require warmed infusion fluids/warming blankets en route. 5% sBP < 90, 95% sBP 90-110. Resuscitation will continue during transport (may include up to 2 units RBCs provided by sending facility (Surgical Co./FRSS only), 500 cc Hespan, and/or 4 liters NaCl).

TASK	% PTS	TASK DESCRIPTION
		CLINICAL CARE
ZZ65	100%	Conduct Patient Hand-Off
ZZ97	100%	Assess/Instruct/Reassure Communications w/Patient
ZZ66	100%	Provide Patient Protective Equipment
ZZ67	100%	Secure Patient to Litter/Airframe
002	100%	Assess Patient Status
ZZ69	100%	Monitor/Assess/Manage BP/MAP
ZZ70	100%	Monitor/Assess/Manage EKG/Pulse
ZZ71	100%	Monitor/Assess/Manage Core Temp
ZZ72	100%	Monitor/Assess/Manage SPO_2
ZZ73	100%	Monitor/Assess/Manage CO_2
ZZ74	5%	Monitor/Assess/Manage Central Venous Pressure
ZZ75	100%	Provide Visual/Audible Instruction/Reassurance
ZZ76	100%	Manage/Secure Lines & Tubes
ZZ77	100%	Assess Airway/Breathing
010	100%	Assess Neurological Status
038	100%	Maintain on Ventilator
062	75%	IV Infusion Blood Products (Provided By Sending Facility, If Available)
082	100%	Measure/Record Urinary Output
ZZ19	100%	Warm Infusion Fluids
ZZA2	100%	Active Patient Rewarming (Chillbuster or Similar)
ZZ58	100%	Pressure Infuse IV Fluid
ZZ80	100%	Perform Suction (E-T Tube/Tracheostomy Tube)
073	100%	Perform Suction (NG/OG Tube)
087	35%	Change/Reinforce Dressing (Overlying ABD Cover Only)
ZZ81	100%	Manage Chest Tubes Including Suction
ZZ82	100%	Collect & Perform Autotransfusions
145	100%	Administer Medications
		CHANGE IN PATIENT STATUS EN ROUTE
Z014	2%	Perform Rapid Sequence Intubation
Z038	5%	Hyperventilate Patient
ZZ89	3%	Re-Establish IV Access (Intraosseous)
Z103	2%	Re-establish Intravenous Access (Intraosseous)
Z027	5%	Cardiopulmonary Resuscitation
007	1%	Perform Emergency Cricothyroidotomy
ZZ03	5%	Perform Needle Thorocostomy
ZZ90	10%	Management of Paralytic/Sedative Drugs
ZZ91	2%	Reinsert Chest Tubes
		ADMINISTRATIVE AND EQUIPMENT SUPPORT
ZZ95	100%	Collect & Manage Biowaste
197	100%	Charting & Paperwork - Patient Specific
ZZ96	100%	Assemble/Replenish/Resupply Materiel
ZZ98	100%	Prev Maintenance, Checks, & Services of Equip (PMCS)
ZZ99	100%	Conduct Operational Risk Management (ORM)
Z100	100%	Manage Patient Personal Effects
Z101	100%	Conduct PMI Exchange
Z102	5%	Troubleshoot Equipment

Postsurgical Staged Ex-Lap

Patient will present with litter, blanket, 100% w/mechanical ventilation, 100% neuromuscular blockade, venous access (angio-cath, lock), 25% central line, 100% foley, NG/OG tube. 85% will be unconscious. 100% will be coagulopathic, hypothermic & require warmed infusion fluids/warming blankets en route. 15% sBP < 90, 85% sBP 90-110. Resuscitation will continue during transport (may include up to 2 units RBCs provided by sending facility (Surgical Co./FRSS only), 500 cc Hespan, and/or 4 liters NaCl).

TASK	% PTS	TASK DESCRIPTION
		CLINICAL CARE
ZZ65	100%	Conduct Patient Hand-Off
ZZ97	100%	Assess/Instruct/Reassure Communications w/Patient
ZZ66	100%	Provide Patient Protective Equipment
ZZ67	100%	Secure Patient to Litter/Airframe
002	100%	Assess Patient Status
ZZ69	100%	Monitor/Assess/Manage BP/MAP
ZZ70	100%	Monitor/Assess/Manage EKG/Pulse
ZZ71	100%	Monitor/Assess/Manage Core Temp
ZZ72	100%	Monitor/Assess/Manage SPO_2
ZZ73	100%	Monitor/Assess/Manage CO_2
ZZ74	5%	Monitor/Assess/Manage Central Venous Pressure
ZZ75	100%	Provide Visual/Audible Instruction/Reassurance
ZZ76	100%	Manage/Secure Lines & Tubes
ZZ77	100%	Assess Airway/Breathing
010	100%	Assess Neurological Status
038	100%	Maintain on Ventilator
062	75%	IV Infusion Blood Products (Provided By Sending Facility, If Available)
082	100%	Measure/Record Urinary Output
ZZ19	100%	Warm Infusion Fluids
ZZ42	100%	Active Patient Rewarming (Chillbuster Or Similar)
ZZ58	100%	Pressure Infuse IV Fluid
ZZ80	100%	Perform Suction (E-T Tube/Tracheostomy Tube)
073	100%	Perform Suction (NG/OG Tube)
087	100%	Change/Reinforce Dressing (Overlying ABD Cover Only)
ZZ83	100%	Manage Abdominal Drains
145	100%	Administer Medications
		CHANGE IN PATIENT STATUS EN ROUTE
Z014	5%	Perform Rapid Sequence Intubation
Z038	5%	Hyperventilate Patient
ZZ89	3%	Re-Establish IV Access (Intraosseous)
Z103	2%	Re-establish Intravenous Access (Intraosseous)
Z027	5%	Cardiopulmonary Resuscitation
007	1%	Perform Emergency Cricothyroidotomy
ZZ03	10%	Perform Needle Thorocostomy
ZZ90	10%	Management of Paralytic/Sedative Drugs
		ADMINISTRATIVE AND EQUIPMENT SUPPORT
ZZ95	100%	Collect & Manage Biowaste
197	100%	Charting & Paperwork - Patient Specific
ZZ96	100%	Assemble/Replenish/Resupply Materiel
ZZ98	100%	Prev Maintenance, Checks, & Services of Equip (PMCS)
ZZ99	100%	Conduct Operational Risk Management (ORM)
Z100	100%	Manage Patient Personal Effects
Z101	100%	Conduct PMI Exchange
Z102	5%	Troubleshoot Equipment

Postsurgical Vascular/Amputation

Patient will present with litter, blanket, 15% w/mechanical ventilation, venous access (angio-cath, or lock), 15% will have a central line, 75% foley, 10% NG/OG tube. 50% will be unconscious. 15% will be in severe shock, 85% will be hypothermic & require warmed infusion fluids/warming blankets en route. 15% sBP < 90, 85% sBP 90-110. 50% will be able to communicate temp & sensation of injured extremity(s). Resuscitation will continue during transport (may include up to 2 units RBCs provided by sending facility (Surgical Co./FRSS only), 500 cc Hespan, and/or 4 liters NaCl).

TASK	% PTS	TASK DESCRIPTION
		CLINICAL CARE
ZZ65	100%	Conduct Patient Hand-Off
ZZ97	100%	Assess/Instruct/Reassure Communications w/Patient
ZZ66	100%	Provide Patient Protective Equipment
ZZ67	100%	Secure Patient to Litter/Airframe
ZZ68	100%	Maintain Appropriate Skeletal Immobilization
002	100%	Assess Patient Status
ZZ69	100%	Monitor/Assess/Manage BP/MAP
ZZ70	100%	Monitor/Assess/Manage EKG/Pulse
ZZ71	85%	Monitor/Assess/Manage Core Temp
ZZ72	100%	Monitor/Assess/Manage SPO_2
ZZ75	100%	Provide Visual/Audible Instruction/Reassurance
ZZ76	100%	Manage/Secure Lines & Tubes
010	100%	Assess Neurological Status
ZZ77	100%	Assess Airway/Breathing
ZZ78	100%	Assess Neurovascular Status
022	85%	O_2 Administration Setup Equipment
023	85%	O_2 Administration Continuous (Mask)
038	15%	Maintain On Ventilator
062	75%	IV Infusion Blood Products (Provided By Sending Facility, If Available)
082	100%	Measure/Record Urinary Output
ZZ19	85%	Warm Infusion Fluids
ZZ42	85%	Active Patient Rewarming (Chillbuster or Similar)
050	50%	Administer IV Fluid
ZZ58	50%	Pressure Infuse IV Fluid
017	35%	Perform Suction (Oropharynx)
ZZ80	15%	Perform Suction (E-T Tube/Trach Tube)
073	10%	Perform Suction (NG/OG Tube)
087	35%	Reinforce Dressing (4x4s, 4x8s, Kerlix)
ZZ84	35%	Manage Saline Lock
ZZ85	100%	Reassess Tourniquet
145	100%	Administer Medications
		CHANGE IN PATIENT STATUS EN ROUTE
Z014	5%	Perform Rapid Sequence Intubation
Z038	5%	Hyperventilate Patient
ZZ89	4%	Re-Establish IV Access (Angiocath)
Z103	1%	Re-Establish IV Access (Intraosseous)
Z027	2%	Cardiopulmonary Resuscitation
007	1%	Perform Emergency Cricothyroidotomy
ZZ03	1%	Perform Needle Thorocostomy
ZZ90	2%	Management Of Paralytic/Sedative Drugs
006	15%	Insert Airway (Oro/Naso Pharyngeal)
079	1%	Catheterization Foley
ZZ92	3%	Reverse Narcotic Induced Respiratory Depression
ZZ64	10%	Sedate Agitated Patient
A6	3%	Apply Tourniquet
019	3%	Control External Hemorrhage
		ADMINISTRATIVE AND EQUIPMENT SUPPORT
ZZ95	100%	Collect & Manage Biowaste
197	100%	Charting & Paperwork - Patient Specific
ZZ96	100%	Assemble/Replenish/Resupply Materiel
ZZ98	100%	Prev Maintenance, Checks, & Services of Equip (PMCS)
ZZ99	100%	Conduct Operational Risk Management (ORM)
Z100	100%	Manage Patient Personal Effects
Z101	100%	Conduct PMI Exchange
Z102	5%	Troubleshoot Equipment

Postsurgical Craniotomy

Patient will present with litter, blanket, 100% will be mechanically ventilated, venous access (angio-cath, lock, or central line), 100% foley, 100% will have NG/OG tube, seizure control meds (phenytoin) will have been administered at sending facility. 90% will be unconscious. 80% sBP = 100-120, 20% sBP > 120 & need intervention. CO2=30 (approx) and will require monitoring during transport. Resuscitation will continue during transport (may include 500cc Hespan and/or 2 liters NaCl).

TASK	% PTS	TASK DESCRIPTION
		CLINICAL CARE
ZZ65	100%	Conduct Patient Hand-Off
ZZ97	100%	Assess/Instruct/Reassure Communications w/Patient
ZZ66	100%	Provide Patient Protective Equipment
ZZ67	100%	Secure Patient to Litter/Airframe
002	100%	Assess Patient Status
ZZ68	100%	Maintain Appropriate Skeletal Immobilization
ZZ69	100%	Monitor/Assess/Manage BP/MAP
ZZ70	100%	Monitor/Assess/Manage EKG/Pulse
ZZ71	100%	Monitor/Assess/Manage Core Temp
ZZ72	100%	Monitor/Assess/Manage SPO_2
ZZ73	100%	Monitor/Assess/Manage CO_2
ZZ75	100%	Provide Visual/Audible Instruction/Reassurance
ZZ76	100%	Manage/Secure Lines & Tubes
010	100%	Assess Neurological Status (GCS, Pupillary Exam)
ZZ77	100%	Assess Airway/Breathing
038	100%	Maintain on Ventilator
082	100%	Measure/Record Urinary Output
ZZ19	100%	Warm Infusion Fluids
ZZ42	75%	Active Patient Rewarming (Chillbuster or Similar)
050	75%	Administer IV Fluid
ZZ58	25%	Pressure Infuse IV Fluid
ZZ80	100%	Perform Suction (E-T Tube/Trach Tube)
073	100%	Perform Suction (NG/OG Tube)
087	35%	Reinforce Dressing (4x4s, Kerlix)
ZZ84	50%	Manage Saline Lock
ZZ86	100%	Manage Subdural Drains
145	75%	Administer Medications
		CHANGE IN PATIENT STATUS EN ROUTE
Z014	5%	Perform Rapid Sequence Intubation
Z038	5%	Hyperventilate Patient
ZZ89	3%	Re-Establish IV Access (Angiocath)
Z103	2%	Re-Establish IV Access (Intraosseous)
Z027	2%	Cardiopulmonary Resuscitation
007	1%	Perform Emergency Cricothyroidotomy
ZZ03	3%	Perform Needle Thorocostomy
ZZ90	2%	Management of Paralytic/Sedative Drugs
ZZ93	7%	Manage Seizing Patient
		ADMINISTRATIVE AND EQUIPMENT SUPPORT
ZZ95	100%	Collect & Manage Biowaste
197	100%	Charting & Paperwork - Patient Specific
ZZ96	100%	Assemble/Replenish/Resupply Materiel
ZZ98	100%	Prev Maintenance, Checks, & Services Of Equip (PMCS)
ZZ99	100%	Conduct Operational Risk Management (ORM)
Z100	100%	Manage Patient Personal Effects
Z101	100%	Conduct PMI Exchange
Z102	5%	Troubleshoot Equipment

Burn > 20% BSA

Patient will present with litter, blanket, 50% w/mechanical ventilation, 50% O2 by mask, venous access x2 (angio-cath, or lock), 100% foley, 100% NG/OG tube, Burn dressings will be applied by sending facility and maintained by en route attendant. 10% will have inhalation injury, 15% will be unconscious. 15% will be in shock, 100% will be hypothermic & require warmed infusion fluids/warming blankets en route. 15% sBP < 90, 85% sBP 90-110. Resuscitation will continue during transport (may include 500cc Hespan and 2 liters Lactated Ringers).

TASK	% PTS	TASK DESCRIPTION
		CLINICAL CARE
ZZ65	100%	Conduct Patient Hand-Off
ZZ97	100%	Assess/Instruct/Reassure Communications w/Patient
ZZ66	100%	Provide Patient Protective Equipment
ZZ67	100%	Secure Patient to Litter/Airframe
002	100%	Assess Patient Status
ZZ69	100%	Monitor/Assess/Manage BP/Pulse
ZZ70	100%	Monitor/Assess/Manage EKG/Pulse
ZZ71	100%	Monitor/Assess/Manage Core Temp
ZZ72	100%	Monitor/Assess/Manage SPO_2
ZZ73	75%	Monitor/Assess/Manage CO_2
ZZ75	100%	Provide Visual/Audible Instruction/Reassurance
ZZ76	100%	Manage/Secure Lines & Tubes
010	15%	Assess Neurological Status (GCS)
ZZ77	100%	Assess Airway/Breathing
ZZ78	100%	Assess Neurovascular Status
022	50%	O_2 Administration Setup Equipment
023	50%	O_2 Administration Continuous (Mask)
038	50%	Maintain on Ventilator
082	100%	Measure/Record Urinary Output
ZZ19	100%	Warm Infusion Fluids
ZZ42	100%	Active Patient Rewarming (Chillbuster or Similar)
ZZ79	100%	Assess BSA to Calculate Fluid Requirements
ZZ58	100%	Pressure Infuse IV Fluid
017	50%	Perform Suction (Oropharynx)
ZZ80	50%	Perform Suction (E-T Tube/Trach Tube)
073	100%	Perform Suction (NG/OG Tube)
ZZ87	100%	Maintain Dry Dressings
145	100%	Administer Medications
		CHANGE IN PATIENT STATUS EN ROUTE
Z014	5%	Perform Rapid Sequence Intubation
Z038	5%	Hyperventilate Patient
ZZ89	3%	Re-Establish IV Access (Angiocath))
Z103	2%	Re-Establish IV Access (Intraosseous)
Z027	2%	Cardiopulmonary Resuscitation
007	1%	Perform Emergency Cricothyroidotomy
ZZ03	1%	Perform Needle Thorocostomy
ZZ90	2%	Management of Paralytic/Sedative Drugs
006	15%	Insert Airway (Oro/Naso Pharyngeal)
079	3%	Catheterization Foley
ZZ92	7%	Reverse Narcotic-Induced Respiratory Depression
ZZ64	5%	Sedate Agitated Patient
ZZ94	1%	Emergent Escharotomy
		ADMINISTRATIVE AND EQUIPMENT SUPPORT
ZZ95	100%	Collect & Manage Biowaste
197	100%	Charting & Paperwork - Patient Specific
ZZ96	100%	Assemble/Replenish/Resupply Materiel
ZZ98	100%	Prev Maintenance, Checks, & Services of Equip (PMCS)
ZZ99	100%	Conduct Operational Risk Management (ORM)
Z100	100%	Manage Patient Personal Effects
Z101	100%	Conduct PMI Exchange
Z102	5%	Troubleshoot Equipment

Class III & IV Hemorrhage/Shock En Route

Patient will present with litter, blanket, venous access (65% angio-caths, 35% central lines), 15% foley, 15% NG/OG tube, 10% E-T tube, external bleeding will be controlled by pressure dressings or tourniquets applied by sending facility, fractures will be immobilized by sending facility. 90% will be conscious. 80% sBP = <90, all will have decreased LOC, cool, pale skins, pulse >100, resp >20 All will require O_2 by mask, dressings reinforced during transport. Resuscitation fluids will be pressure infused en route (may include up to 2 units RBCs provided by sending facility (Surg Co./FRSS only), 500 cc Hespan, and/or 4 liters NaCl).

TASK	% PTS	TASK DESCRIPTION
		CLINICAL CARE
ZZ65	100%	Conduct Patient Hand-Off
ZZ97	100%	Assess/Instruct/Reassure Communications w/Patient
ZZ66	100%	Provide Patient Protective Equipment
ZZ67	100%	Secure Patient to Litter/Airframe
002	100%	Assess Patient Status
ZZ69	100%	Monitor/Assess/Manage BP/MAP
ZZ70	100%	Monitor/Assess/Manage EKG/Pulse
ZZ71	100%	Monitor/Assess/Manage Core Temp
ZZ72	100%	Monitor/Assess/Manage SPO_2
ZZ73	10%	Monitor/Assess/Manage CO_2
ZZ74	1%	Monitor/Assess/Manage Central Venous Pressure
ZZ75	100%	Provide Visual/Audible Instruction/Reassurance
ZZ76	100%	Manage/Secure Lines & Tubes
010	100%	Assess Neurological Status (Glasgow)
ZZ77	100%	Assess Airway/Breathing
022	100%	O2 Administration Setup Equipment
023	100%	O2 Administration Continuous (Mask)
062	75%	Iv Infusion Blood Products (Provided By Sending Facility, If Available)
082	100%	Measure/Record Urinary Output
ZZ19	100%	Warm Infusion Fluids
ZZ42	100%	Active Patient Rewarming (Chillbuster or Similar)
ZZ58	100%	Pressure Infuse IV Fluid
017	90%	Perform Suction (Oropharynx)
ZZ80	10%	Perform Suction (E-T Tube/Trach Tube)
073	15%	Perform Suction (NG/OG Tube)
087	100%	Reinforce Dressing (Field Dressings, Kerlix)
ZZ85	100%	Reassess Tourniquet
145	90%	Administer Medications
		CHANGE IN PATIENT STATUS EN ROUTE
Z014	5%	Perform Rapid Sequence Intubation
Z038	5%	Hyperventilate Patient
ZZ89	3%	Re-Establish IV Access (Angiocath)
Z103	2%	Re-Establish IV Access (Intraosseous)
Z027	2%	Cardiopulmonary Resuscitation
007	1%	Perform Emergency Cricothyroidotomy
ZZ03	1%	Perform Needle Thorocostomy
006	15%	Insert Airway (Oro/Naso Pharyngeal)
079	1%	Catheterization Foley
ZZ92	4%	Reverse Narcotic-Induced Respiratory Depression
ZZ64	7%	Sedate Agitated Patient
A6	3%	Apply Tourniquet
019	3%	Control External Hemorrhage
		ADMINISTRATIVE AND EQUIPMENT SUPPORT
ZZ95	100%	Collect & Manage Biowaste
197	100%	Charting & Paperwork - Patient Specific
ZZ96	100%	Assemble/Replenish/Resupply Materiel
ZZ98	100%	Prev Maintenance, Checks, & Services of Equip (PMCS)
ZZ99	100%	Conduct Operational Risk Management (ORM)
Z100	100%	Manage Patient Personal Effects
Z101	100%	Conduct PMI Exchange
Z102	5%	Troubleshoot Equipment

Crush/Blunt Trauma

Patient will present with litter*1, blanket*1, 10 % will be mechanically ventilated*1, 90% will require O2 by mask, venous access (angio-cath, lock, or central line), 100% foley, 75% will have NG/OG tube. 80% will have bilateral extremity injury, 15% will have associated pelvic fracture. 35% will present with developing metabolic acidosis, myoglobinuria, & rhabdomyolysis. 15% will be unconscious. 15% will have altered LOC, 75% sBP = 100-120, 25% sBP <100 & need intervention to increase during transport, pulse >100, resp will be >20 & shallow. Emphasis for care en route will be osmotic renal diuresis & monitoring urine output. Resuscitation will continue during transport (may include 500cc Hespan and/or 2 liters NaCl).

TASK	% PTS	TASK DESCRIPTION
		CLINICAL CARE
ZZ65	100%	Conduct Patient Hand-Off
ZZ97	100%	Assess/Instruct/Reassure Communications w/Patient
ZZ66	100%	Provide Patient Protective Equipment
ZZ67	100%	Secure Patient to Litter/Airframe
ZZ68	100%	Maintain Appropriate Skeletal Immobilization
002	100%	Assess Patient Status
ZZ69	100%	Monitor/Assess/Manage BP/MAP
ZZ70	100%	Monitor/Assess/Manage EKG/Pulse
ZZ71	100%	Monitor/Assess/Manage Core Temp
ZZ72	100%	Monitor/Assess/Manage SPO_2
ZZ73	10%	Monitor/Assess/Manage CO_2
ZZ75	100%	Provide Visual/Audible Instruction/Reassurance
ZZ76	100%	Manage/Secure Lines & Tubes
010	100%	Assess Neurological Status (GCS)
ZZ77	100%	Assess Airway/Breathing
022	90%	O2 Administration Setup Equipment
023	90%	O2 Administration Continuous (Mask)
038	10%	Maintain on Ventilator
082	100%	Measure/Record Urinary Output
ZZ19	75%	Warm Infusion Fluids
050	75%	Administer IV Fluid
ZZ58	25%	Pressure Infuse IV Fluid
017	15%	Perform Suction (Oropharynx)
ZZ80	10%	Perform Suction (E-T Tube/Trach Tube)
073	75%	Perform Suction (NG/OG Tube)
087	35%	Reinforce Dressing (4x4s, Kerlix)
145	75%	Administer Medications
		CHANGE IN PATIENT STATUS EN ROUTE
Z014	5%	Perform Rapid Sequence Intubation
Z038	5%	Hyperventilate Patient
ZZ89	3%	Re-Establish IV Access (Angiocath)
Z103	1%	Re-Establish IV Access (Intraosseous)
Z027	2%	Cardiopulmonary Resuscitation
007	1%	Perform Emergency Cricothyroidotomy
079	2%	Catheterization Foley
ZZ03	1%	Perform Needle Thorocostomy
ZZ90	1%	Management of Paralytic/Sedative Drugs
006	15%	Insert Airway (Oro/Naso Pharyngeal)
ZZ92	5%	Reverse Narcotic-Induced Respiratory Depression
ZZ64	5%	Sedate Agitated Patient
		ADMINISTRATIVE AND EQUIPMENT SUPPORT
ZZ95	100%	Collect & Manage Biowaste
197	100%	Charting & Paperwork - Patient Specific
ZZ96	100%	Assemble/Replenish/Resupply Materiel
ZZ98	100%	Prev Maintenance, Checks, & Services of Equip (PMCS)
ZZ99	100%	Conduct Operational Risk Management (ORM)
Z100	100%	Manage Patient Personal Effects
Z101	100%	Conduct PMI Exchange
Z102	5%	Troubleshoot Equipment

Head Trauma

Patient will present with litter, blanket, 60% will be mechanically ventilated, 40% O2 by mask, venous access (angio-cath, lock), 15% foley, 100% will have NG/OG tube, seizure control meds (phenytoin) will have been administered at sending facility, osmotics, if required, will be provided by sending facility. 95% will be unconscious. 80% sBP = 100-120, 20% sBP > 120 & need intervention. Resuscitation will continue during transport (may include 1 -2 liters NaCl).

TASK	% PTS	TASK DESCRIPTION
		CLINICAL CARE
ZZ65	100%	Conduct Patient Hand-Off
ZZ97	100%	Assess/Instruct/Reassure Communications w/Patient
ZZ66	100%	Provide Patient Protective Equipment
ZZ67	100%	Secure Patient to Litter/Airframe
002	100%	Assess Patient Status
ZZ68	100%	Maintain Appropriate Skeletal Immobilization
ZZ69	100%	Monitor/Assess/Manage BP/MAP
ZZ70	100%	Monitor/Assess/Manage EKG/Pulse
ZZ71	100%	Monitor/Assess/Manage Core Temp
ZZ72	100%	Monitor/Assess/Manage SPO_2
ZZ73	60%	Monitor/Assess/Manage CO_2
ZZ75	100%	Provide Visual/Audible Instruction/Reassurance
ZZ76	100%	Manage/Secure Lines & Tubes
010	100%	Assess Neurological Status (GCS, Pupillary Exam)
ZZ77	100%	Assess Airway/Breathing
022	40%	O_2 Administration Setup Equipment
023	40%	O_2 Administration Continuous (Mask)
038	60%	Maintain On Ventilator
082	100%	Measure/Record Urinary Output
050	100%	Administer IV Fluid
017	40%	Perform Suction (Oropharynx)
ZZ80	60%	Perform Suction (E-T Tube/Trach Tube)
073	100%	Perform Suction (NG/OG Tube)
087	15%	Reinforce Dressing (4x4s, Kerlix)
ZZ84	50%	Manage Saline Lock
145	25%	Administer Medications
		CHANGE IN PATIENT STATUS EN ROUTE
Z014	5%	Perform Rapid Sequence Intubation
Z038	5%	Hyperventilate Patient
ZZ89	3%	Re-Establish IV Access (Angiocath)
Z103	2%	Re-Establish IV Access (Intraosseous)
Z027	2%	Cardiopulmonary Resuscitation
007	1%	Perform Emergency Cricothyroidotomy
079	1%	Catheterization Foley
ZZ03	3%	Perform Needle Thorocostomy
ZZ90	2%	Management of Paralytic/Sedative Drugs
006	10%	Insert Airway (Oro/Naso Pharyngeal)
ZZ93	8%	Manage Seizing Patient
ZZ64	5%	Sedate Agitated Patient
		ADMINISTRATIVE AND EQUIPMENT SUPPORT
ZZ95	100%	Collect & Manage Biowaste
197	100%	Charting & Paperwork - Patient Specific
ZZ96	100%	Assemble/Replenish/Resupply Materiel
ZZ98	100%	Prev Maintenance, Checks, & Services of Equip (PMCS)
ZZ99	100%	Conduct Operational Risk Management (ORM)
Z100	100%	Manage Patient Personal Effects
Z101	100%	Conduct PMI Exchange
Z102	5%	Troubleshoot Equipment

Medical – Acute Abdomen

Patient will present with litter, blanket, venous access (angio-cath, lock), 75% NG/OG tube, 35% O2 by mask. Patient is alert with low-grade fever, in pain, anxious, lies in guarded lateral position. sBP >120, resp >20 & shallow, pulse >90. 5% will present with tense, rigid, or distended abdomen. 75% will experience nausea, vomiting, or diarrhea en route. Patients will require fluid therapy en route (85% will require 500cc Hespan and/or 1-2LT crystalloid, 15% will require >2LTs crystalloid resuscitation for on-going internal hemorrhage during transport).

TASK	% PTS	TASK DESCRIPTION
		CLINICAL CARE
ZZ65	100%	Conduct Patient Hand-Off
ZZ97	100%	Assess/Instruct/Reassure Communications w/Patient
ZZ66	100%	Provide Patient Protective Equipment
ZZ67	100%	Secure Patient to Litter/Airframe
002	100%	Assess Patient Status
ZZ69	100%	Monitor/Assess/Manage BP/MAP
ZZ70	100%	Monitor/Assess/Manage EKG/Pulse
ZZ71	100%	Monitor/Assess/Manage Core Temp
ZZ72	100%	Monitor/Assess/Manage SPO_2
ZZ75	100%	Provide Visual/Audible Instruction/Reassurance
ZZ76	100%	Manage/Secure Lines & Tubes
010	100%	Assess Neurological Status (GCS)
ZZ77	100%	Assess Airway/Breathing
022	35%	O_2 Administration Setup Equipment
023	35%	O_2 Administration Continuous (Mask)
082	100%	Measure/Record Urinary Output
ZZ19	10%	Warm Infusion Fluids
050	85%	Administer IV Fluid
ZZ58	15%	Pressure Infuse IV Fluid
073	75%	Perform Suction (NG/OG Tube)
ZZ84	75%	Manage Saline Lock
145	75%	Administer Medications
		CHANGE IN PATIENT STATUS EN ROUTE
Z014	5%	Perform Rapid Sequence Intubation
Z038	5%	Hyperventilate Patient
ZZ89	2%	Re-Establish IV Access (Angiocath)
Z027	2%	Cardiopulmonary Resuscitation
006	10%	Insert Airway (Oro/Naso Pharyngeal)
079	1&	Catheterization Foley
ZZ92	2%	Reverse Narcotic-Induced Respiratory Depression
ZZ64	5%	Sedate Agitated Patient
		ADMINISTRATIVE AND EQUIPMENT SUPPORT
ZZ95	100%	Collect & Manage Biowaste
197	100%	Charting & Paperwork - Patient Specific
ZZ96	100%	Assemble/Replenish/Resupply Materiel
ZZ98	100%	Prev Maintenance, Checks, & Services of Equip (PMCS)
ZZ99	100%	Conduct Operational Risk Management (ORM)
Z100	100%	Manage Patient Personal Effects
Z101	100%	Conduct PMI Exchange
Z102	5%	Troubleshoot Equipment

Medical – Environmental Emergency

Patient will present with litter, blanket, 10% will be mechanically ventilated*1, 90% will require O2 by mask, venous access (angio-cath, lock, or central line), 10% E-T tube (gentle intubation technique not found to predispose pt to VF (Hall & Syverud 1990-{prospective, multicenter study}), 35% NG/OG tube, 35% foley, cold/heat packs provided by sending facility, seizure control meds (phenytoin) will have been administered at sending facility. 65% will be cold emergency, 35% heat emergency, 75% will be unconscious, 25% will be conscious w/altered LOC. Cold emergencies will have sBP <90, pulse <60, resp <12. Heat emergencies will have pulse >110, resp >20. Resuscitation will continue during transport (cold emergencies will receive 1LT warmed NaCl during first 2 hour period, Heat emergencies will receive 2 - 4LT dependent upon urinary output monitored during transport).

TASK	% PTS	TASK DESCRIPTION
		CLINICAL CARE
ZZ65	100%	Conduct Patient Hand-Off
ZZ97	100%	Assess/Instruct/Reassure Communications w/Patient
ZZ66	100%	Provide Patient Protective Equipment
ZZ67	100%	Secure Patient to Litter/Airframe
002	100%	Assess Patient Status
ZZ69	100%	Monitor/Assess/Manage BP/MAP
ZZ70	100%	Monitor/Assess/Manage EKG/Pulse
ZZ71	100%	Monitor/Assess/Manage Core Temp
ZZ72	100%	Monitor/Assess/Manage SPO_2
ZZ73	60%	Monitor/Assess/Manage CO_2
ZZ75	100%	Provide Visual/Audible Instruction/Reassurance
ZZ76	100%	Manage/Secure Lines & Tubes
010	100%	Assess Neurological Status (GCS)
ZZ77	100%	Assess Airway/Breathing
022	90%	O_2 Administration Setup Equipment
023	90%	O_2 Administration Continuous (Mask)
038	10%	Maintain on Ventilator
082	100%	Measure/Record Urinary Output
ZZ19	65%	Warm Infusion Fluids
ZZ42	65%	Active Patient Rewarming (Chillbuster Or Similar)
050	100%	Administer IV Fluid
017	40%	Perform Suction (Oropharynx)
ZZ80	10%	Perform Suction (E-T Tube/Trach Tube)
073	35%	Perform Suction (NG/OG Tube)
ZZ84	75%	Manage Saline Lock
ZZ88	100%	Maintain Cooling/Rewarming Procedures (Packs)
145	75%	Administer Medications
		CHANGE IN PATIENT STATUS EN ROUTE
Z014	5%	Perform Rapid Sequence Intubation
Z038	5%	Hyperventilate Patient
ZZ89	2%	Re-Establish IV Access (Angiocath)
Z103	1%	Re-Establish IV Access (Intraosseous)
Z027	2%	Cardiopulmonary Resuscitation
007	1%	Perform Emergency Cricothyroidotomy
079	3%	Catheterization Foley
ZZ90	1%	Management of Paralytic/Sedative Drugs
ZZ92	3%	Reverse Narcotic-Induced Respiratory Depression
006	10%	Insert Airway (Oro/Naso Pharyngeal)
ZZ64	5%	Sedate Agitated Patient
ZZ93	5%	Manage Seizing Patient
		ADMINISTRATIVE AND EQUIPMENT SUPPORT
ZZ95	100%	Collect & Manage Biowaste
197	100%	Charting & Paperwork - Patient Specific
ZZ96	100%	Assemble/Replenish/Resupply Materiel
ZZ98	100%	Prev Maintenance, Checks, & Services Of Equip (PMCS)
ZZ99	100%	Conduct Operational Risk Management (ORM)
Z100	100%	Manage Patient Personal Effects
Z101	100%	Conduct PMI Exchange

Medical – Anaphylaxis/Asthma

Patient will present with litter, blanket, 15% will be mechanically ventilated, 85% will require O_2 by mask, venous access (angio-cath, lock), 15% E-T tube, 15% NG/OG tube. 90% will be conscious, 15% sBP <100, 15% pulse >100, resp >20 & shallow w/stridor. 15% patients will receive 2LT NaCl rapid infusion, 85% will receive 1LT NaCl TKO during transport.

TASK	% PTS	TASK DESCRIPTION
		CLINICAL CARE
ZZ65	100%	Conduct Patient Hand-Off
ZZ97	100%	Assess/Instruct/Reassure Communications w/Patient
ZZ66	100%	Provide Patient Protective Equipment
ZZ67	100%	Secure Patient to Litter/Airframe
002	100%	Assess Patient Status
ZZ69	100%	Monitor/Assess/Manage BP/MAP
ZZ70	100%	Monitor/Assess/Manage EKG/Pulse
ZZ72	100%	Monitor/Assess/Manage SPO_2
ZZ73	25%	Monitor/Assess/Manage CO_2
ZZ75	100%	Provide Visual/Audible Instruction/Reassurance
ZZ76	100%	Manage/Secure Lines & Tubes
010	100%	Assess Neurological Status (GCS)
ZZ77	100%	Assess Airway/Breathing
022	85%	O_2 Administration Setup Equipment
023	85%	O_2 Administration Continuous (Mask)
038	15%	Maintain On Ventilator
ZZ19	15%	Warm Infusion Fluids
ZZ42	15%	Active Patient Rewarming (Chillbuster Or Similar)
050	85%	Administer IV Fluid
ZZ58	15%	Pressure Infuse IV Fluid
017	10%	Perform Suction (Oropharynx)
ZZ80	15%	Perform Suction (E-T Tube/Trach Tube)
073	15%	Perform Suction (NG/OG Tube)
ZZ84	75%	Manage Saline Lock
145	100%	Administer Medications
		CHANGE IN PATIENT STATUS EN ROUTE
Z014	5%	Perform Rapid Sequence Intubation
Z038	5%	Hyperventilate Patient
ZZ89	3%	Re-Establish IV Access (IAngiocath)
Z103	1%	Re-Establish IV Access (Intraosseous)
Z027	2%	Cardiopulmonary Resuscitation
007	1%	Perform Emergency Cricothyroidotomy
079	1%	Catheterization Foley
ZZ90	1%	Management of Paralytic/Sedative Drugs
006	10%	Insert Airway (Oro/Naso Pharyngeal)
ZZ64	5%	Sedate Agitated Patient
		ADMINISTRATIVE AND EQUIPMENT SUPPORT
ZZ95	100%	Collect & Manage Biowaste
197	100%	Charting & Paperwork - Patient Specific
ZZ96	100%	Assemble/Replenish/Resupply Materiel
ZZ98	100%	Prev Maintenance, Checks, & Services of Equip (PMCS)
ZZ99	100%	Conduct Operational Risk Management (ORM)
Z100	100%	Manage Patient Personal Effects
Z101	100%	Conduct PMI Exchange
Z102	5%	Troubleshoot Equipment

Medical –Cardiac Event

Patient will present with litter, blanket, <10% will be mechanically ventilated, 90% will require O_2 by mask, venous access (angio-cath, lock), 10% E-T tube. 95% will be conscious, diaphoretic, resp >20 & shallow.

TASK	% PTS	TASK DESCRIPTION
		CLINICAL CARE
ZZ65	100%	Conduct Patient Hand-Off
ZZ97	100%	Assess/Instruct/Reassure Communications w/Patient
ZZ66	100%	Provide Patient Protective Equipment
ZZ67	100%	Secure Patient to Litter/Airframe
002	100%	Assess Patient Status
ZZ69	100%	Monitor/Assess/Manage Bp/Map
ZZ70	100%	Monitor/Assess/Manage Ekg/Pulse
ZZ72	100%	Monitor/Assess/Manage SPO_2
ZZ73	25%	Monitor/Assess/Manage CO_2
ZZ75	100%	Provide Visual/Audible Instruction/Reassurance
ZZ76	100%	Manage/Secure Lines & Tubes
010	100%	Assess Neurological Status (GCS)
ZZ77	100%	Assess Airway/Breathing
022	90%	O_2 Administration Setup Equipment
023	90%	O_2 Administration Continuous (Mask)
038	10%	Maintain on Ventilator
050	100%	Administer IV Fluid
017	10%	Perform Suction (Oropharynx)
ZZ80	10%	Perform Suction (E-T Tube/Trach Tube)
ZZ84	75%	Manage Saline Lock
145	100%	Administer Medications
		CHANGE IN PATIENT STATUS EN ROUTE
Z014	5%	Perform Rapid Sequence Intubation
Z038	5%	Hyperventilate Patient
ZZ89	2%	Re-Establish IV Access (Angiocath)
Z027	2%	Cardiopulmonary Resuscitation
007	1%	Perform Emergency Cricothyroidotomy
079	1%	Catheterization Foley
ZZ90	1%	Management of Paralytic/Sedative Drugs
006	10%	Insert Airway (Oro/Naso Pharyngeal)
ZZ92	7%	Reverse Narcotic-Induced Repiratory Depression
ZZ64	5%	Sedate Agitated Patient
		ADMINISTRATIVE AND EQUIPMENT SUPPORT
ZZ95	100%	Collect & Manage Biowaste
197	100%	Charting & Paperwork - Patient Specific
ZZ96	100%	Assemble/Replenish/Resupply Materiel
ZZ98	100%	Prev Maintenance, Checks, & Services of Equip (PMCS)
ZZ99	100%	Conduct Operational Risk Management (ORM)
Z100	100%	Manage Patient Personal Effects
Z101	100%	Conduct PMI Exchange
Z102	5%	Troubleshoot Equipment

Appendix D

List of Unique Tasks
Assigned to the En Route Care PTs

List of Unique Tasks Assigned to En Route Care PTs

002	Asses Patient Status
006	Insert Airway (Oro/Naso Pharyngeal)
007	Perform Emergency Cricothyroidotomy
010	Assess Neurological Status (Gcs)
017	Perform Suction (Oropharynx)
019	Control External Hemorrhage
022	O_2 Administration Setup Equipment
023	O_2 Administration Continuous (Mask)
038	Maintain On Ventilator
050	Administer IV Fluid
062	IV Infusion Blood Products
073	Perform Suction (Ng/Og Tube)
079	Catheterization Foley
082	Measure/Record Urinary Output
087	Change/Reinforce Dressing
145	Administer Medications
197	Charting & Paperwork - Patient Specific
A6	Apply Tourniquet
Z014	Perform Rapid Sequence Intubation
Z027	Cardiopulmonary Resuscitation
Z038	Hyperventilate Patient
Z100	Manage Patient Personal Effects
Z101	Conduct PMI Exchange
Z102	Troubleshoot Equipment
Z103	Re-Establish IV Access (Intraosseous)
ZZ03	Perform Needle Thorocostomy
ZZ19	Warm Infusion Fluids
ZZ42	Active Patient Rewarming (Chillbuster or Similar)
ZZ58	Pressure Infuse Iv Fluid/Blood Products
ZZ64	Sedate Agitated Patient
ZZ65	Conduct Patient Hand-Off
ZZ66	Provide Patient Protective Equipment
ZZ67	Secure Patient to Litter/Airframe
ZZ68	Maintain Appropriate Skeletal Immobilization
ZZ69	Monitor/Assess/Manage BP/MAP
ZZ70	Monitor/Assess/Manage EKG/Pulse
ZZ71	Monitor/Assess/Manage Core Temp
ZZ72	Monitor/Assess/Manage SPO_2
ZZ73	Monitor/Assess/Manage CO_2
ZZ74	Monitor/Assess/Manage Central Venous Pressure
ZZ75	Provide Visual/Audible Instruction/Reassurance
ZZ76	Manage/Secure Lines & Tubes
ZZ77	Assess Airway/Breathing
ZZ78	Assess Neurovascular Status
ZZ79	Assess BSA to Calculate Fluid Requirements
ZZ80	Perform Suction (E-T Tube/Tracheostomy Tube)
ZZ81	Manage Chest Tubes Including Suction
ZZ82	Collect & Perform Autotransfusions
ZZ83	Manage Abdominal Drains
ZZ84	Manage Saline Lock
ZZ85	Reassess Tourniquet
ZZ86	Manage Subdural Drains

ZZ87	Maintain Dry Dressings
ZZ88	Maintain Cooling/Rewarming Procedures (Packs)
ZZ89	Re-Establish IV Access (Angiocath)
ZZ90	Management of Paralytic Drugs
ZZ91	Reinsert Chest Tubes
ZZ92	Reverse Narcotic Induced Respiratory Depression
ZZ93	Manage Seizing Patient
ZZ94	Emergent Escharotomy
ZZ95	Collect & Manage Biowaste
ZZ96	Assemble/Replenish/Resupply Materiel
ZZ97	Assess/Instruct/Reassure Communications w/Patient
ZZ98	Prev Maintenance, Checks, & Services Of Equip (PMCS)
ZZ99	Conduct Operational Risk Management (ORM)

Appendix E

En Route Care
Tasks and Supplies

(Supply quantities shown are the requirement for conducting each task 1 time)

En Route Care System Tasks and Supplies

NSN	Item Nomenclature	Amount	UM
Task 002: ASSESS PATIENT STATUS			
6515014553888	Lantern Electric Head Mount Halogen/Krypton	1	Each
6540014553885	Lens Cover Red Lantern Electric Head Mount	1	Each
6545014586178	Otoscope & Opthalmoscope Set Deluxe Soft Case	1	Set
6515010394884	Sphygmomanmeter Aneroid 300MM Hg Maximum	1	Each
6515013146694	Stethoscope Littman Classic II 28 Inch Length	1	Each
6515011676637	Airway Nasopharyngeal Robertazzi 30 Fr 12S	.1	Each
6515011649637	Airway Oropharyngeal Cut-Away Flange 30 Fr 30S	.9	Each
Task 007: PERFORM EMERGENCY CRICOTHYROIDOTOMY			
6515013215211	Airway Kit Percutaneous Emergency Adult Single	1	Each
Task 010: ASSESS NEUROLOGICAL STATUS (GLASGOW)			
xxxxxxxxxxx26	Manual Task – No Supplies Assigned This Task		
Task 017: PERFORM SUCTION (OROPHARYNX)			
6515010726380	Cannula Laryngeal Yankauer w/Tubing 72 Inch	1	Each
6515014350050	Suction Apparatus Surgical Portable	1	Each
Task 019: CONTROL EXTERNAL HEMMORRHAGE[1,2]			
6515000583047	Bandage Guaze Kerlix 4.5 Inch x 4 Yards 100S	1	Roll
6515000835573	Dressing First Aid Field White 4 x 6 Inches	1	Each
6515000775706	Pad Abdominal 7.5 x 8 Ince White	1	Each
6515007219808	Sponge Surgical Cotton Gauze 4 x 4 Inch 1200S	2-6	Each
Task 022: OXYGEN ADMINISTRATION EQUIPMENT SET-UP			
6515013716467	Mask Oxygen Oronasal Non-rebreather 50S	1	Each
6515014626143	Oxygen Admin Kit–Case/ Regulator/ Demand Valve	1	Each
Task 023: OXYGEN ADMINISTRATION CONTINUOUS - MASK			
6505001325181	Oxygen USP 99% Cylinder D Type 95 Gallon	1	Each
Task 038: MAINTAIN PATIENT ON VENTILATOR			
6515014661195	Circuit Ventilator Vinyl Disp 6 Feet Long	.35	Each
6515012796450	Monitor Oxygen Alarmed 6.75 x 3.5 Inch Size	1	Each
6530014551653	Ventilator Volume Portable Univent 754 8 x 11 Inch	1	Each
Task 050: ADMINISTER INTAVENOUS FLUID INFUSION			
6505014622436	Sodium Chloride Injection 0.9% 1000ML Bag 12S	1	Each
Task 062: ADMINISTER IV INFUSION – BLOOD PRODUCTS			
xxxxxxxxxxx14	Blood Pack RBCs 1 Unit (provided by sending MTF)	1	Each
6505001487177	Diphenhydramine Syringe w/Needle 50MG/ML 10S	1	Each
6515007863736	Pad Prep Isopropyl Alcohol Impreg 1x2.5 IN 100S	1	Each
Task 073: PERFORM SUCTION – NG/OG TUBE			

[1]The required *supplies* vary depending on ERC patient type
[2] The required *quantities* vary depending on ERC patient type

(Supply quantities shown are the requirement for conducting each task1 time)

NSN	Item Nomenclature	Amount	UM
6515014350050	Suction Apparatus Surgical Portable	1	Each
Task 079: CATHETERIZATION - FOLEY			
6515001490104	Catheterization Kit Urethral 16 French Disp	1	Each
Task 082: MEASURE/RECORD URINARY OUTPUT			
xxxxxxxxxxx39	Clip Board Thigh Mount Flight Crew Lighted 5x9 IN	1	Each
7520009357136	Pen Ball-Point Retractable Medium Black	0.05	Each
Task 087: CHANGE/REINFORCE DRESSING[1,2]			
6515000583047	Bandage Guaze Kerlix 4.5 Inch x 4 Yards 100S	1	Roll
6515000835573	Dressing First Aid Field White 4 x 6 Inches	1	Each
6515000775706	Pad Abdominal 7.5 x 8 Ince White	1	Each
6515007219808	Sponge Surgical Cotton Gauze 4 x 4 Inch 1200S	2-6	Each
Task 145: ADMINISTER APPROPRIATE MEDICATIONS[1,2]			
6505013809548	Adenosine Inj 3MG/ML 2ML Single Dose Vial 10S	6-30	MG
6505011169245	Albuterol Inhalation 17GM Container 200 Sprays	1	CO
6505001009985	Aspirin Tablets 0.32GM 100 per Bottle	2	Tabs
6505001375891	Diazepam Inj 5MG/ML 2ML Syringe w/Needle 10S	1	Each
6505001487177	Diphenhydramine Syringe w/Needle 50MG/ML 10S	1	Each
6505007341026	Epinephrine Inj 1MG/ML 1ML Ampule 10S	1	Amp
6505011947265	Lidocaine HCL 0.4% & D%W 500ML Bag 18S	1	Bag
6505008556984	Meperidine HCL Inj 100MG/ML 1ML Syringe 10S	1	Each
6505011080808	Methylprednisolone Succinate Inj 1000MG Vial	1	Vial
6505013092742	Metoprolol Tartrate Inj 1MG/ML 5ML Ampule 12S	5	MG
6505012444736	Midazolam HCL Inj 5MG/ML 1ML Vial	1-3	MG
6505001490113	Morphine Sulfate Inj 10MG 1ML Cartridge Unit 10S	1	Each
6505012463781	Nitroglycerine Lingual Aerosol 0.4MG 200 Doses	3	Doses
6505006807352	Promethazine HCL Inj 25MG/ML 1ML Ampule 25S	1	Amp
6505014562380	Scopolamine Transdermal System 1.5MG 4 Patches	1	Patch
6505002165370	Sodium Bicarb 8.4% Syringe-Ndl 1mEq/ML 50ML	1	Each
6515013448487	Injector Tubex Reusable 1ML & 2ML Needle Units	1	Each
6515007863736	Pad Prep Isopropyl Alcohol Impreg 1x2.5 IN 100S	1-4	Each
6515014587025	Syringe-Needle Unit Vanish-Point 10CC 21GA 100S	1-2	Each
6515004627348	Syringe-Needle Unit 3ML Luer Tip 100s	1-2	Each
Task 197: CHARTING & PAPER WORK			
xxxxxxxxxxx39	Clip Board Thigh Mount Flight Crew Lighted 5x9 IN	1	Each
7530002815941	Folder Set File Manila 8.8 x 11.7 Inch 100s	1	Each
7520009357136	Pen Ball-Point Retractable Medium Black	0.05	Each
Task A6: APPLY TORNIQUET			
6515003830565	Tourniquet Nonpneumatic 42 x 1.5 Inch Camouflage	1	Each
Task Z014: PERFORM RAPID SEQUNCE INTUBATION			
6515014509790	Laryngoscope Set Softcase w/Light & Blades	1	Set
6505012444736	Midazolam HCL Inj 5MG/ML 1ML Vial	2	MG
6515007863736	Pad Prep Isopropyl Alcohol Impreg 1x2.5 IN 100S	1	Each
6515013948327	Stylet Tracheal Tube 7.5-100MM Plastic Disp 10S	.25	Each
6515004627348	Syringe-Needle Unit 3ML Luer Tip 100s	1	Each
6510009268882	Tape Adhesive Surgical Woven 1 Inch x 12 Yard 12S	0.1	Roll
6515011039034	Tube Endotracheal Murphy 7.5MM OD 12s	0.6	Each
6515001050759	Tube Endotracheal Murphy 8.0MM OD 12s	0.4	Each
Task Z027: CARDIOPULMONARY RESUSCITATION[1,2]			

(Supply quantities shown are the requirement for conducting each task1 time)

NSN	Item Nomenclature	Amount	UM
6505007542547	Atropine Sulfate Inj 0.4MG/ML 20ML Vial	1-5	ML
6505010932384	Epinephrine Inj 0.1MG/ML Syringe-Ndl 10ML 10S	1-3	Each
6505011947265	Lidocaine HCL 0.4% & D%W 500ML Bag 18S	1	Bag
6505011561797	Lidocaine HCL Inj 1% 5ML 50MG Syringe-Ndl 10S	1-3	Each
6505002165370	Sodium Bicarb 8.4% Syringe-Ndl 1mEq/ML 50ML	1	Each
6515014947971	Battery Pack Automated External Defibrillator	1	Each
6515014794272	Defibrillator Automated External w/Monitor	1	Each
6515007863736	Pad Prep Isopropyl Alcohol Impreg 1x2.5 IN 100S	1-5	Each
6515014594403	Pads Defibrillator Automated External 2-Pack	1	Pair
6515004627348	Syringe-Needle Unit 3ML Luer Tip 100s	1-5	Each
Task Z038: HYPERVENTILATE PATIENT			
6515012045394	Resuscitator Hand Operated Bag Valve Mask	1	Each
Task Z100: MANAGE PATIENT PERSONAL EFFECTS			
xxxxxxxxxxx25	No Supplies Assigned this Task		
Task Z101: CONDUCT PATIENT MOVEMENT ITEM EXCHANGE			
xxxxxxxxxxx26	Manual Task – No Supplies Assigned This Task		
Task Z102: TROUBLESHOOT EQUIPMENT PROBLEMS			
xxxxxxxxxxx25	No Supplies Assigned this Task		
Task Z103: RE-ESTABLISH INTRAVENOUS ACCESS (INTRAOSSEOUS)			
6515014530960	Intraosseous Infusion Set F.A.S.T 1™	1	Each
6515011050614	IV Injection Set Macrodrip 15 Drops/ML 50S	0.25	Each
6515007863736	Pad Prep Isopropyl Alcohol Impreg 1x2.5 IN 100S	1	Each
6510009268882	Tape Adhesive Surgical Woven 1 Inch x 12 Yard 12S	0.1	Roll
Task ZZ03: PERFORM NEEDLE THOROCOSTOMY			
6515013909627	Catheter & Needle Unit IV 14GA 1.25 Inch 200S	2	Each
6515007219808	Sponge Surgical Cotton Gauze 4 x 4 Inch 1200S	2	Each
6515014587025	Syringe-Needle Unit Vanish-Point 10CC 21GA 100S	1	Each
Task ZZ19: WARM INTRAVENOUS INFUSION FLUIDS			
NSN Pending	Battery Pack Rechargeable Thermal Angel	1	Each
NSN Pending	Case Carrying Battery Thermal Angel	1	Each
NSN Pending	Charger Battery Thermal Angel	1	Each
NSN Pending	Power Cord Thermal Angel	1	Each
NSN Pending	Warmer Fluid Thermal Angel	1	Each
Task ZZ42: PERFORM ACTIVE PATIENT REWARMING			
NSN Pending	Blanket Rewarming w/Charger Chillbuster	1	Each
NSN Pending	Cover Rewarming Blanket Chillbuster Disposable	1	Each
Task ZZ58: POWER INFUSE INTRAVENOUS FLUIDS[1,2]			
6505012811247	Hespan Inj in Sodium Chloride 500ML Bag 12S	1	Each
6505014623025	Ringer's Injection Lactated 1000ML Bag 12S	1-3	Each
6505014622436	Sodium Chloride Injection 0.9% 1000ML Bag 12S	1-3	Each
6515014661488	Cartridge Pump Intravenous Power Infusor 10S	1	Each
6515014854362	Infusor Pump Intravenous Power M110B-3A	1	Each
Task ZZ64: SEDATE AGITATED PATIENT			

(Supply quantities shown are the requirement for conducting each task1 time)

NSN	Item Nomenclature	Amount	UM
6505001375891	Diazepam Inj 5MG/ML 2ML Syringe w/Needle 10S	1	Each
6505012444736	Midazolam HCL Inj 5MG/ML 1ML Vial	2	MG
6505006807352	Promethazine HCL Inj 25MG/ML 1ML Ampule 25S	1	Amp
6515007863736	Pad Prep Isopropyl Alcohol Impreg 1x2.5 IN 100S	1	Each
6515004627348	Syringe-Needle Unit 3ML Luer Tip 100s	1	Each
Task ZZ65: CONDUCT PATIENT HAND-OFF			
xxxxxxxxxxx26	Manual Task – No Supplies Assigned This Task		
Task ZZ66: PROVIDE PATIENT PERSONAL PROTECTIVE EQUIPMENT			
xxxxxxxxxxx11	Equipment Provided by Aircrew		
Task ZZ67: SECURE PATIENT TO LITTER/AIRFRAME			
6530014325114	Litter Rigid Folding Raven Polypropylene	1	Each
xxxxxxxxxxx16	SMEED Equipment Device Platform	1	Each
Task ZZ68: MAINTAIN APPROPRIATE SKELETAL IMMOBILIZATION			
xxxxxxxxxxx25	No Supplies Assigned this Task		
Task ZZ69: MONITOR/ASSESS/MANAGE BP/MEAN ARTERIAL PRESSURE			
PN: 11020941	Monitor Patient Vital Signs Propaq Model 206	1	Each
Task ZZ70: MONITOR/ASSESS/MANAGE ECG/PULSE			
PN: 11020941	Monitor Patient Vital Signs Propaq Model 206	1	Each
6515011535752	Electrode ECG Pregelled 4.4CM Diameter 25S	3	Each
Task ZZ71: MONITOR/ASSESS/MANAGE CORE TEMPERATURE			
PN: 11020941	Monitor Patient Vital Signs Propaq Model 206	1	Each
Task ZZ72: MONITOR/ASSESS/MANAGE SPO_2			
PN: 11020941	Monitor Patient Vital Signs Propaq Model 206	1	Each
Task ZZ73: MONITOR/ASSESS/MANAGE CO_2			
PN: 11020941	Monitor Patient Vital Signs Propaq Model 206	1	Each
Task ZZ74: MONITOR/ASSESS/MANAGE CENTRAL VENOUS PRESSURE			
PN: 11020941	Monitor Patient Vital Signs Propaq Model 206	1	Each
Task ZZ75: PROVIDE VISUAL/AUDIBLE INSTRUCTION/REASSURANCE			
xxxxxxxxxxx26	Manual Task – No medical Supplies Assigned This Task		
Task ZZ76: MANAGE/SECURE LINES & TUBES (INCL CV LINES)			
6510009268882	Tape Adhesive Surgical Woven 1 Inch x 12 Yard 12S	0.1	Roll
Task ZZ77: ASSESS AIRWAY/BREATHING			
6515013146694	Stethoscope Littman Classic II 28 Inch Length	1	Each
Task ZZ78: ASSESS NEUROVASCULAR STATUS (PMS)			
xxxxxxxxxxx26	Manual Task – No medical Supplies Assigned This Task		

(Supply quantities shown are the requirement for conducting each task1 time)

NSN	Item Nomenclature	Amount	UM
Task ZZ79: ASSESS BSA TO CALCULATE FLUID REQUIREMENTS			
xxxxxxxxxx26	Manual Task – No medical Supplies Assigned This Task		
Task ZZ80: PERFORM SUCTION (ET TUBE/TRACHEOSTOMY TUBE)			
6515014350050	Suction Apparatus Surgical Portable	1	Each
6515004588411	Catheter & Connector Whistle Tip 14 French 50S	1	Each
Task ZZ81: MANAGE CHEST TUBES INCLUDING SUCTION			
6515014350050	Suction Apparatus Surgical Portable	1	Each
Task ZZ82: COLLECT & PERFORM AUTOTRANSFUSIONS			
xxxxxxxxxx37	Pleurevac Auto Transfusor (Supplied by MTF)		
Task ZZ83: MANAGE ABDOMINAL DRAINS			
xxxxxxxxxx26	Manual Task – No medical Supplies Assigned This Task		
Task ZZ84: MANAGE SALINE LOCK			
6505014622436	Sodium Chloride Injection 0.9% 1000ML Bag 12S	.05	Each
6515014587025	Syringe-Needle Unit Vanish-Point 10CC 21GA 100S	1	Each
Task ZZ85: REASSESS TOURNIQUET			
xxxxxxxxxx26	Manual Task – No medical Supplies Assigned This Task		
Task ZZ86: MANAGE SUBDURAL DRAINS			
xxxxxxxxxx26	Manual Task – No medical Supplies Assigned This Task		
Task ZZ87: MAINTAIN DRY DRESSINGS[2]			
6515000583047	Bandage Guaze Kerlix 4.5 Inch x 4 Yards 100S	1	Roll
6515007219808	Sponge Surgical Cotton Gauze 4 x 4 Inch 1200S	2-4	Each
Task ZZ88: MAINTAIN COOLING/REWARMING PROCEDURES (PACKS)			
6510014644424	Compress Cold Instant Non-Toxic 80S	2	Each
6530013171131	Pad Heating Chemical Plastic	2	Each
Task ZZ89: RE-ESTABLISH INTRAVENOUS ACCESS (ANGIOCATH)			
6515013909627	Catheter & Needle Unit IV 14GA 1.25 Inch 200S	.6	Each
6515013909654	Catheter & Needle Unit IV 18GA 1.25 Inch 200S	.4	Each
6515011050614	IV Injection Set Macrodrip 15 Drops/ML 50S	0.25	Each
6515007863736	Pad Prep Isopropyl Alcohol Impreg 1x2.5 IN 100S	1	Each
6510009268882	Tape Adhesive Surgical Woven 1 Inch x 12 Yard 12S	0.1	Roll
Task ZZ90: MANAGEMENT OF PARALYTIC/SEDATIVE DRUGS			
6505001375891	Diazepam Inj 5MG/ML 2ML Syringe w/Needle 10S	1	Each
6505012444736	Midazolam HCL Inj 5MG/ML 1ML Vial	2	MG
6515007863736	Pad Prep Isopropyl Alcohol Impreg 1x2.5 IN 100S	1	Each
6515004627348	Syringe-Needle Unit 3ML Luer Tip 100s	1	Each
Task ZZ91: RE-INSERT CHEST TUBES			
6515006600011	Blade Surgical Knife Detachable #10 6S	1	Each
6515003344900	Forceps Hemostatic Halsted Mosquito Point 5 Inch	2	Each
6515003373800	Forceps Tissue Adson 4.5 Inch Tweezer	1	Each
6515003447800	Handle Surgical Knife Blade Size 3 Narrow Nose	1	Each
6515013417200	Holder Suture Needle Collier 5 Inch Straight	1	Each

(Supply quantities shown are the requirement for conducting each task1 time)

NSN	Item Nomenclature	Amount	UM
6515003640920	Scissors General Surgical Mayo 7 Inch Striaght	1	Each
6515011535733	Suture Non-Absorbable Size 1 Monofilament 12S	1	Each
6515008669073	Tube Drainage Surgical Thoracic 36 French 10S	1	Each
Task ZZ92: REVERSE NARCOTIC-INDUCED RESPIRATORY DEPRESSION[2]			
6505000797867	Naloxone HCL Inj 0.4MG/ML Ampule 10S	1-2	Amps
6515007863736	Pad Prep Isopropyl Alcohol Impreg 1x2.5 IN 100S	1-2	Each
6515004627348	Syringe-Needle Unit 3ML Luer Tip 100s	1-2	Each
Task ZZ93: MANAGE SEIZING PATIENT[2]			
6505001375891	Diazepam Inj 5MG/ML 2ML Syringe w/Needle 10S	1-2	Each
6505012444736	Midazolam HCL Inj 5MG/ML 1ML Vial	1-2	MG
6515007863736	Pad Prep Isopropyl Alcohol Impreg 1x2.5 IN 100S	1-2	Each
6515004627348	Syringe-Needle Unit 3ML Luer Tip 100s	1-2	Each
Task ZZ94: EMERGENT ESCHAROTOMY			
6515006600011	Blade Surgical Knife Detachable #10 6S	1	Each
6515003344900	Forceps Hemostatic Halsted Mosquito Point 5 Inch	2	Each
6515003373800	Forceps Tissue Adson 4.5 Inch Tweezer	1	Each
6515003447800	Handle Surgical Knife Blade Size 3 Narrow Nose	1	Each
6515013417200	Holder Suture Needle Collier 5 Inch Straight	1	Each
6515003640920	Scissors General Surgical Mayo 7 Inch Striaght	1	Each
Task ZZ95: COLLECT & MANAGE BIOWASTE			
6530011075798	Bag Sterilization-Biohazard Disp 36x24 Inch 200S	0.25	Each
6530014617882	Bedpan Pontoon Style Plastic Autoclavable 12S	1	Each
6530014604782	Container Sharps Fold-Flat 5 Liter 25S	0.01	Each
6530010422485	Urinal Male Patient Plastic Disposable	0.50	Each
Task ZZ96: ASSEMBLE/REPLENISH/RESUPPLY MATERIEL			
xxxxxxxxxxx25	No Supplies Assigned this Task		
Task ZZ97: ASSESS/INSTRUCT/REASSURE COMMUNICATIONS w/PATIENT			
xxxxxxxxxxx26	Manual Task – No medical Supplies Assigned This Task		
Task ZZ98:PREVENTIVE MAINTENANCE,CHECKS & SERVICES OF EQUIP			
xxxxxxxxxxx26	Manual Task – No medical Supplies Assigned This Task		
Task ZZ99: CONDUCT OPERATIONAL RISK MANAGEMENT (ORM)			
xxxxxxxxxxx26	Manual Task – No medical Supplies Assigned This Task		

Appendix F

Aviation-Related Support Tasks

Aviation-Related Support Tasks

Able to Perform Principals of Aviation Survival & Safety

Camp & Platform Safety & Security

Assesses Need & Demonstrates Use of Oxygen in Airborne Environment

Demonstrates Flight Line Safety & Aircraft Security

Received Specific Air Platform Orientation

Demonstrates Load Master Skills

Recognizes Needs & Demands Related to Flight Physiology

Performs Pt. Pre-Flight Preparation and Transport

Correctly Loads & Positions Patient in Aircraft

Correctly Secures Patient in Aircraft

Conducts Care with Night Vision Goggles

Able to Troubleshoot Equipment

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14. ABSTRACT (maximum 200 words)

This report is organized into six sections. Section 1, introduction; Section 2, an overview of the medical evacuation system; Section 3 references relevant doctrinal guidance used to focus the development of En Route Care System. The development of the methodology, patient treatment profiles, and medications, supplies and equipment requirements are detailed in Section 3. Section 4 reviews the SMEs' recommendations for ERCS personnel; Sections 5 and 6 present some issues and conclusions related to en route care.

Current Marine Corps warfighting concepts anticipate an increasingly hostile and uncertain battlefield that will be defended by highly mobile and dispersed combat forces. Such an environment requires a reduced medical presence that responds quickly without compromising the standard of care. To achieve these goals, the Marine Corps must rely more heavily on medical evacuation and en route care, the process of providing essential medical care while transporting critically injured and ill casualties.

The Marine Corps has launched an effort to develop the ERCS. Naval Health Research Center and Marine Corps Combat Development Center sponsored a conference to (1) identify the equipment and consumable supplies required to provide en route care during tactical medical evacuation, and (2) determine the skills and personnel required to provide en route care. The objectives of this paper are to provide a comprehensive understanding of the need for en route care, detail the pertinent factors shaping ERCS, and document the development of ERCS medical resource requirements. Included in this paper is a description of the en route care conference, which helped to define the clinical capability needed to provide en route care of critically injured and ill casualties during tactical evacuation. Highly experienced military subject matter experts (SMEs) discussed the knowledge base and clinical skills necessary to provide en route care during tactical evacuation, e.g., clinical skills include but not limited to airway management; ventilator management, verifying tidal volume and cuff pressures, recalibrating at altitude, and optimizing settings if oxygenation worsens or deteriorates, etc.

The implications of altitude on a variety of medical factors, including reduced atmospheric pressure, dehydration, motion sickness, and fatigue, were also covered. Every attempt was made to standardize medical materiel with the Forward Resuscitative Surgery System and other Marine Corps medical assemblages.

14. SUBJECT TERMS
En Route Care System

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